



# THE LEGAL- INSTITUTIONAL ANALYSIS MODEL (LIAM): A VALIDATION STUDY

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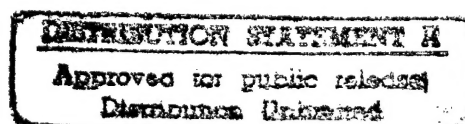


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THE LEGAL-INSTITUTIONAL ANALYSIS MODEL (LIAM):  
A VALIDATION STUDY

Instream Flow Information Paper No. 25

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## PREFACE

Professionals who work on instream flow problems often get together at scientific meetings to talk shop. One of the most common topics of conversation is how to do better at negotiations. Inexperience, lack of training, and frustration are all discussed. In the main, however, the conversation turns to misperceptions and missed opportunities. Misperceiving an opponent's needs or an opponent's strategy is a gross impediment to successful negotiation.

Some years ago an attempt was made to understand what happens during instream flow negotiations. Lamb (1976) described the basic factors that seemed to undergird interagency negotiations about instream flows. That work synthesized hypotheses drawn from public administration and foreign policy decisionmaking research into a model to explain agency behavior in bargaining. Beckett and Lamb (1976), Lamb and Doerksen (1978), and Doerksen and Lamb (1979) expanded on these findings, sharpening the idea of agency role and the use of power in negotiation. Perhaps because of its visceral appeal, the idea of power in water resources management has received a good deal of attention over the years, most recently by Clarke and McCool (1985). The idea of agency role, however, has developed more slowly.

In 1980, Lamb reported an analysis of water quality planning efforts using a typology of agency roles (Advocate, Guardian, Broker, and Arbitrator) that later formed the basis for the Legal-Institutional Analysis Model. This concept was later examined in research conducted at the National Ecology Research Center. For example, Olive (1981, 1983) used the typology of roles to improve understanding of the instream flow protection policies of California and Iowa. Furthermore, he suggested the idea that Lowi's (1971) work would help flesh out the arena concept suggested earlier by Beckett and Lamb (1976). Lamb and Hindman (1984) used anecdotal analysis in applying the roles to weather modification programs, and Lamb and Lovrich (1987) refined the role descriptions in examining urban instream flow programs. Wilds (1986) recompiled all these ideas into a package known as the Legal-Institutional Analysis Model. With the help of a number of researchers at the Center, she developed and tested a questionnaire to be used as part of a software package. This software package, carrying the name Legal-Institutional Analysis Model, was developed by several individuals including Kirk Smith, Charles Loeffler, Leah Wilds, and Berton Lamb. The results were documented in a user's manual by Young and Radtke (1987). The software allows a user to answer questions about a particular agency in a given conflict. Based on the answers, the software assigns a role type to that agency, suggests the basis of the agency's negotiating power, and describes likely behavior. Descriptions of this sort can be generated for any number of agencies.



Beginning in about 1978, professional staff at the Center used the role typology found in the Legal-Institutional Analysis Model to describe negotiations. When consulting with agencies about how to plan instream flow negotiations and in formal training sessions, Center staff used the roles to demonstrate how to plan the negotiations. By 1981 it was clear that more was called for than just telling people such analysis could be done. Rather a mechanism was needed that would allow professionals in the field to actually use these ideas. This led to the work by Lamb and Wilds, culminating in building the software.

Once the software was available, a formal test of the concepts embodied in the role descriptions was possible. This paper presents the results of that test.

## CONTENTS

	<u>Page</u>
PREFACE .....	iii
FIGURES .....	vi
TABLES .....	viii
ACKNOWLEDGMENTS .....	ix
 INTRODUCTION .....	 1
Background .....	1
The Legal-Institutional Analysis Model .....	3
METHODS .....	9
Research Design .....	11
LIAM Questionnaire Design .....	13
Reliability of the Questionnaire .....	13
Validity: The Questionnaire and The Model .....	16
Individual Bias: Cluster Analysis .....	20
RESULTS .....	21
Data Collection: Phases I, II, and III .....	21
Reliability of the Questionnaire .....	21
Validity: The Questionnaire and The Model .....	44
Individual Bias: Cluster Analysis .....	62
DISCUSSION .....	64
Summary .....	64
Conclusions .....	67
Implications .....	67
Agenda for the Future .....	68
REFERENCES .....	70

## FIGURES

<u>Number</u>		<u>Page</u>
1	The four quadrants of an LIAM role map (A-D) .....	7
2	The 16 subquadrants (1-16) of an LIAM role map .....	8
3	Phase I (NPO) role boxplots, Broker-Arbitrator variables (7 organizations) .....	24
4	Phase I (NPO) role boxplots, Advocate-Guardian variables (7 organizations) .....	25
5	Phase II (PO) role boxplots, Broker-Arbitrator variables (7 organizations) .....	27
6	Phase II (PO) role boxplots, Advocate-Guardian variables (7 organizations) .....	28
7	Phase I (NPO) and Phase II (PO) role boxplots, Broker variable (5 organizations common to both LIAM analyses) .....	30
8	Phase I (NPO) and Phase II (PO) role boxplots, Arbitrator variable (5 organizations common to both LIAM analyses) .....	31
9	Phase I (NPO) and Phase II (PO) role boxplots, Advocate variable (5 organizations common to both LIAM analyses) .....	32
10	Phase I (NPO) and Phase II (PO) role boxplots, Guardian variable (5 organizations common to both LIAM analyses) .....	33
11	Phase I (NPO) power boxplots, Organizational Resources variable (7 organizations) .....	35
12	Phase I (NPO) power boxplots, Expertise variable (7 organizations) .....	36
13	Phase I (NPO) power boxplots, Interest Group Support variable (7 organizations) .....	37
14	Phase II (PO) power boxplots, Organizational Resources variable (7 organizations) .....	38
15	Phase II (PO) power boxplots, Expertise variable (7 organizations) .....	39

# FIGURES (Concluded)

<u>Number</u>		<u>Page</u>
16	Phase II (PO) power boxplots, Interest Group Support variable (7 organizations) .....	40
17	Phase I (NPO) and Phase II (PO) power boxplots, Organizational Resources variable (5 organizations common to both LIAM analyses) .....	41
18	Phase I (NPO) and Phase II (PO) power boxplots, Expertise variable (5 organizations common to both LIAM analyses) .....	42
19	Phase I (NPO) and Phase II (PO) power boxplots, Interest Group Support variable (5 organizations common to both LIAM analyses) .....	43
20	LIAM role map (mean scores, Phase II analysis) .....	45
21	Phase III (PO) matching exercise: expected and observed behavioral patterns (KEA) .....	47
22	Phase III (PO) matching exercise: expected and observed behavioral patterns (FERC) .....	48
23	Phase III (PO) matching exercise: expected and observed behavioral patterns (ADNR) .....	49
24	Phase III (PO) matching exercise: expected and observed behavioral patterns (ADFG) .....	50
25	Phase III (PO) matching exercise: expected and observed behavioral patterns (FWS-ES) .....	51
26	Phase III (PO) matching exercise: expected and observed behavioral patterns (Refuge) .....	52
27	Phase III (PO) matching exercise: expected and observed behavioral patterns (DOR) .....	53
28	Phase III (PO) cluster analysis: two groups of respondents identified by professional background (engineers vs. biologists) .....	63

## TABLES

<u>Number</u>		<u>Page</u>
1	Characteristics associated with each role type .....	5
2	Characteristics contributing to organizational power .....	10
3	List of organizations and number of respondents (Terror Lake conflict) .....	22
4	Role correlations: Spearman's rank correlation coefficients ...	60
5	Role and power correlations: Spearman's rank correlation coefficients .....	61

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## INTRODUCTION

When professionals have to negotiate instream flows and other resource issues for water resource projects, they often find the bargaining difficult. These negotiations result from attempts to implement regulatory policies related to the National Environmental Policy Act (NEPA) environmental impact statements, Federal Energy Regulatory Commission (FERC) licenses, 404 permits and other environmental protection programs. The difficulties are often technical and, almost always, professionals face complex political problems. A technology has been developed to help fish and wildlife managers plan for these negotiations. This technology, the Legal-Institutional Analysis Model (LIAM), has been subjected to rigorous analysis, and the results are presented in this paper. To the extent the LIAM is a useful tool, the bargaining over implementing regulatory policies may be facilitated.

## BACKGROUND

While many regulatory policies related to the protection and management of the Nation's water resources have been formulated, implementation of these programs has been difficult. This is partially due to the high costs and technical difficulties involved. Opposition to full implementation has increased as the costs have become more and more apparent. One critical factor has been reduced resources due to budget cuts. In addition, fiscal and public support for the continued implementation and rigorous enforcement of environmental regulation has fluctuated somewhat (Downs 1972; Dunlap and Dillman 1976; Mitchell 1984), and the current Federal administration has emphasized deregulation as part of the answer to improving the economy (Reagan 1981; Vig and Kraft 1984).

Some experts believe that the United States has moved from an era of formulating environmental quality goals to one of searching for more efficient, economic, and politically feasible techniques for protecting the environment (Ingram and Mann 1978). This search has proven to be more difficult than even pessimists anticipated. Technology has not been able to meet challenges presented by implementation. Jurisdictional confusion has become commonplace, since more than one level of government and many different types of organizations are involved in any given implementation area. Private and public organizations alike have frequently resorted to litigation to either block or improve implementation efforts (Anderson 1973; Liroff 1976; Wenner 1982).

Many government agencies are involved in interpreting, implementing, and adjusting policy in a complicated environment of technical analysis and political trade-offs. The bureaucratic activity that results is confusing to observers and participants alike. Indeed, Baden and Stroup (1981) claim that

the bureaucracy itself is to blame for many of the problems that arise in implementation. They assert that the regulatory agencies involved need to be made more accountable for their actions before the economic and environmental costs associated with bureaucratic management of our natural resources can be reduced--and before further progress can be made.

Misunderstandings often arise because environmental policy administration has both technical and political aspects (Ingram et al. 1984; Lamb 1984). Indeed, some observers suggest that policy implementation is more political than technological (Mann 1982; Yaffe 1982). According to Yaffe (1982:7), environmental policy implementation occurs in an environment where the ". . . mode of interaction is negotiation." In spite of all the evidence to the contrary, many individuals still believe environmental policy implementation is a fairly simple technical matter. Some natural resource managers, for example, do not recognize the political aspects of conflicts in which they become involved. They concentrate on the technical issues. These technical issues are usually not as complex or as mysterious as the political and institutional problems involved.

A number of scholars have brought attention to the crucial need for assessment techniques in resolving resource problems, and have recognized the need for institutional analysis as a first step toward understanding and resolving a problem (Ingram et al. 1984; Freudenburg and Keating 1985; Cortner and Marsh 1986). Institutional analysis is a generic term for analyzing, understanding, and explaining "those legal, political, and administrative processes and structures" through which public policy decisions are made (Ingram et al. 1984:323). This includes rigorous definition of the problem itself and the context in which it will be resolved. The more in-depth and systematic the analysis, the more likely the identification of potential barriers and constraints to effective program implementation. Institutional analysis is most useful when it takes the analyst beyond traditional surveys of relevant laws and institutions to the assessment of alternative solutions and the development of viable strategies (Daneke and Priscoli 1979; Ingram et al. 1984). The method that this study investigates is based on the idea of organizational role.

The concept of role frequently has been used to understand, explain, or predict individual behavior. In the last decade, this concept has been extended to organizations. A model has been developed that postulates role-taking among natural resource organizations (Beckett and Lamb 1976; Lamb 1976; Lamb and Doerksen 1978; Doerksen and Lamb 1979; Lamb 1980; Olive 1981, 1983). That model was first put forward in comprehensive terms by Wilds (1986) as the Legal-Institutional Analysis Model (LIAM). Wilds summarized the theoretical underpinnings of organizational role-taking as developed in the literature, detailed the context in which roles are played out, fine-tuned four role types (Broker, Arbitrator, Advocate, and Guardian) that can be applied to a wide variety of water resource organizations, and described the major components of organizational power that come into play in these negotiations.

The four theoretical assumptions that underlie LIAM are as follows: (1) at the organizational level, decisions are made incrementally; that is, internal organizational decisions are based in large part on past experience,



and new choices differ only marginally from past policy stands; (2) at the organizational level, decisions are also shaped by organizational process--standard operating procedures that have developed over time and that determine the nature and functioning of the organization's internal decisionmaking structure; (3) both incrementalism and organizational process are reinforced by the existence of organizational "psychologies"--intergroup solidarity and cohesiveness--which also helps explain the persistent reliance on incrementalism and organizational process; and (4) at the system or intergroup level, decisionmaking among organizations is characterized by competition, bargaining, and compromise; moreover, the degree to which any one group has to adjust its position is directly related to the power differentials involved and the relative position of that organization vis-a-vis the others. (For a background on these theories see Beckett and Lamb 1976; Lamb 1976, 1980; Lamb and Doerksen 1978; Olive 1981, 1983; and Wilds 1986, 1988).

The first three facets of decisionmaking listed above (incrementalism, organizational process, and group psychology or culture) also represent the factors that lead to the development and persistence of the organizational roles. Within the general boundaries established by the laws, and the set of policies that develops under those laws, interested parties come together and determine ultimate policy outcomes in most water resource conflicts. This process is a highly competitive and interactive one, and the driving force that moves the issues toward resolution is power.

Based on the noted references, Wilds (1986) developed a step-by-step analytical framework (LIAM) that individuals could use to assess environmental impact assessment conflicts in which they were involved. These assessments, in turn, could be used to better understand both the processes and other organizations involved, and to develop organizational strategies for participating in negotiating the conflicts that typically ensued.

Wilds (1986) also developed a questionnaire to measure the elements in the LIAM. Individuals involved in environmental impact assessment negotiations may use the questionnaire to systematically assess conflicts prior to becoming involved in their resolution. The questionnaire allows the would-be negotiator to employ the LIAM without having to master the theoretical literature.

The LIAM questionnaire was designed to allow users to categorize the organizations involved in a conflict according to role types, determine the relative type and amounts of power distributed among these organizations, and predict the likely pattern of behavior for each organization. This study was undertaken to determine if--and to what degree--the model, and the questionnaire developed therefrom, allows users to accomplish these goals.

## THE LEGAL-INSTITUTIONAL ANALYSIS MODEL

The Legal Institutional Analysis Model (LIAM) is a systematic method by which individuals participating in water resource conflicts can analyze disputes in which they will become involved. The model is based upon a synthesis of various social science concepts, developed as part of the continuing effort to understand and explain policymaking in the U.S. These

concepts include policy systems, incrementalism, organizational process, group psychology, and bureaucratic politics (see Wilds 1986 for a complete description of these concepts). The combined result of these phenomena is that organizational behavior is highly consistent--and thus predictable. Prediction is incorporated into LIAM using the concept of roles. Roles can be thought of as guides for understanding, characterizing, and predicting organizational behavior (Lamb 1980).

### Organizational Roles

Four major role types have been identified among organizations that typically participate in water resource use and management conflicts (Beckett and Lamb 1976; Lamb 1976, 1980; Olive 1981, 1983). The first two--Broker and Arbitrator--describe the behavioral patterns that emerge as a result of the preferences organizations have for operating in a particular decisionmaking environment. Brokers prefer to operate in the distributive arena, where policy benefits are distributed among the various participants. The division of the resources (in the form of permits, licenses, project-related values, conditions, mitigation requirements, etc.) is determined in negotiations among the participants in a bargaining context. Initial positions are frequently altered as compromises are made. Distributive decisions are greatly influenced by political information, such as cost-benefit analyses and public and constituency support data (Lamb 1980; Olive 1981, 1983).

Arbitrators prefer to operate in the regulatory arena, where decisions are made by quasi-judicial or judicial entities, based on evidence and proposals presented by the different sides to the controversy. In the regulatory arena, an attempt is made to objectively select the alternative that offers the "best" solution to the problem at hand. Scientific data and technical information are highly valued in this arena (Lamb 1980; Olive 1981, 1983).

The second behavioral dimension contained in the model relates to the preferences organizations have for a particular type of outcome, and contains two additional role types: Advocates and Guardians. An Advocate is an intensely ideological, pro-change, usually environmentalist organization. An Advocate actively seeks to alter the traditional and generally pro-developmental ways in which natural resources have been used and managed in the past. Advocates urge that resources be conserved and that projects and developers be strictly regulated. At the opposite end of this continuum, Guardians attempt to protect the market utility of resources, and will therefore resist attempts to change the ways in which resources have been used and managed in the past (Lamb 1980; Olive 1981, 1983).

Most water resource decisions are the result of conflict, competition, and compromise between organizations with diverse interests and unequal abilities to influence the outcome. The model helps make predictions about which role an organization will take in a climate of interactive bargaining.

Each of the four role types described above has several distinguishing characteristics (Table 1). The LIAM questionnaire (Appendix I), which is stored on a computer program, is based on these organizational characteristics.

Table 1. Characteristics associated with each role type.

---

1. BROKER ROLE CHARACTERISTICS

Physical control/ownership of resources  
Promotes political solution  
Distributes policy benefits and services  
Promotes negotiated outcome

2. ARBITRATOR ROLE CHARACTERISTICS

Prefers objective information  
Presides over formal decision process  
Establishes regulations and procedures  
Hears/solicits information from all sides

3. ADVOCATE ROLE CHARACTERISTICS

Urges change toward nonmarket considerations  
Protectionist of natural resources  
Uses objective information  
Reactive  
Crusader (offensive)

4. GUARDIAN ROLE CHARACTERISTICS

Uses political facts/information  
Prefers economic approaches  
Resists change  
Crusader (defensive)

---

Three questions were developed for each organizational characteristic associated with each of the four role types. The questions were designed to allow the user to "measure" the degree to which a given organization has these characteristics. The computer program selects the questions in random order and presents them in a series to the user. For each question, the user chooses the response choice that is most appropriate for the organization being analyzed.

The response choices for each question can range from extreme agreement to extreme disagreement; each response choice is numerically coded on a scale from one-to-five. For each response choice selected, the program assigns the appropriate score. The responses related to a particular role type are averaged to determine an index for that role type. Once indices for all four role types are calculated for a given organization, this information is used

to select the expected behavioral patterns for the organization. Most organizations, however, are unlikely to have characteristics associated with only one role type in each behavioral dimension. Organizations are multi-dimensional and possess different combinations of characteristics. Thus, questionnaire results inform the user of the expected dominant and secondary role types for each organization, as well as the intensity of expected behavior.

To determine the dominant role type in each behavioral dimension, the Broker-Arbitrator scores are separated from the Advocate-Guardian scores. The first set of scores is a measure of the degree to which an organization prefers to have the conflict resolved in the distributive and regulatory context. The lower score is subtracted from the higher one, and the difference or final score represents a measure of the degree to which an organization prefers one set of procedures over the other. The second set of scores (Advocate-Guardian) is a measure of the degree to which an organization prefers environmental or developmental outcomes. Again, the lower score is subtracted from the higher one, and the resulting score represents a measure of organizational preference for one outcome type over the other.

These two scores are used to locate an organization on the Broker-Arbitrator and Advocate-Guardian continuum. The two points are plotted on a role grid or map, which represents that organization's location on a behavioral map (Figure 1). An organization located in any one of the four quadrants on this role map (A-D) is expected to exhibit behaviors associated with a combination of the two relevant role types. Organizations located in quadrant A, for example, are expected to prefer a brokered decision and a pro-environmental outcome; in B, a brokered decision and a pro-developmental outcome; in C, an arbitrated decision and a pro-developmental outcome; and in D, an arbitrated decision and an environmental outcome. The model predicts the degree of each of the preferences.

The farther out on each continuum an organization lies, the more extreme will be its preferences--and the more extreme will be its behavior. Each of the 16 subquadrants in Figure 2 is associated with a set of specific expected behaviors; each behavioral description indicates both the intensity of the expected behaviors and the dominant role type for a given organization. For example, an organization located in subquadrant A-1 is labeled within the LIAM as a "Moderate Advocate-Broker." The organization is predicted to prefer a pro-environmental outcome (over a pro-developmental one) that is either decided by a broker or determined in the distributive arena (over the regulatory one). The expected behaviors associated with location in subquadrant A-1 are as follows:

Is protective of environmental and noneconomic values, and will join forces with others to resist proposals or projects that threaten those values. Will cooperate in efforts to change the ways in which resources have been used and managed in the past, and will contribute to crusading efforts initiated by others on behalf of the environment. Will use scientific and technical data to support its position. Prefers a negotiated outcome in which decisions are a result of bargaining among players. Thus it will not resist efforts

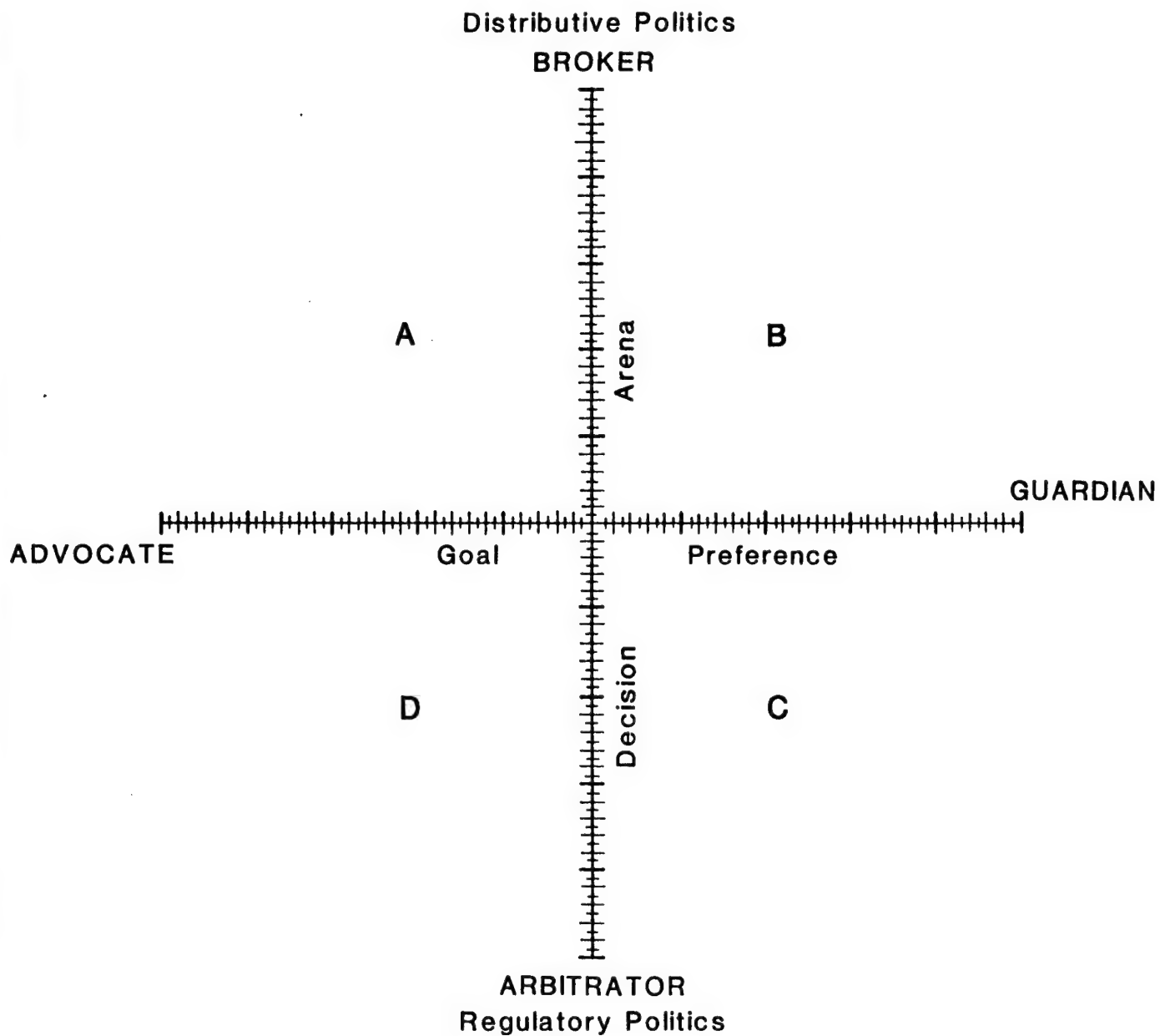


Figure 1. The four quadrants of an LIAM role map (A-D).

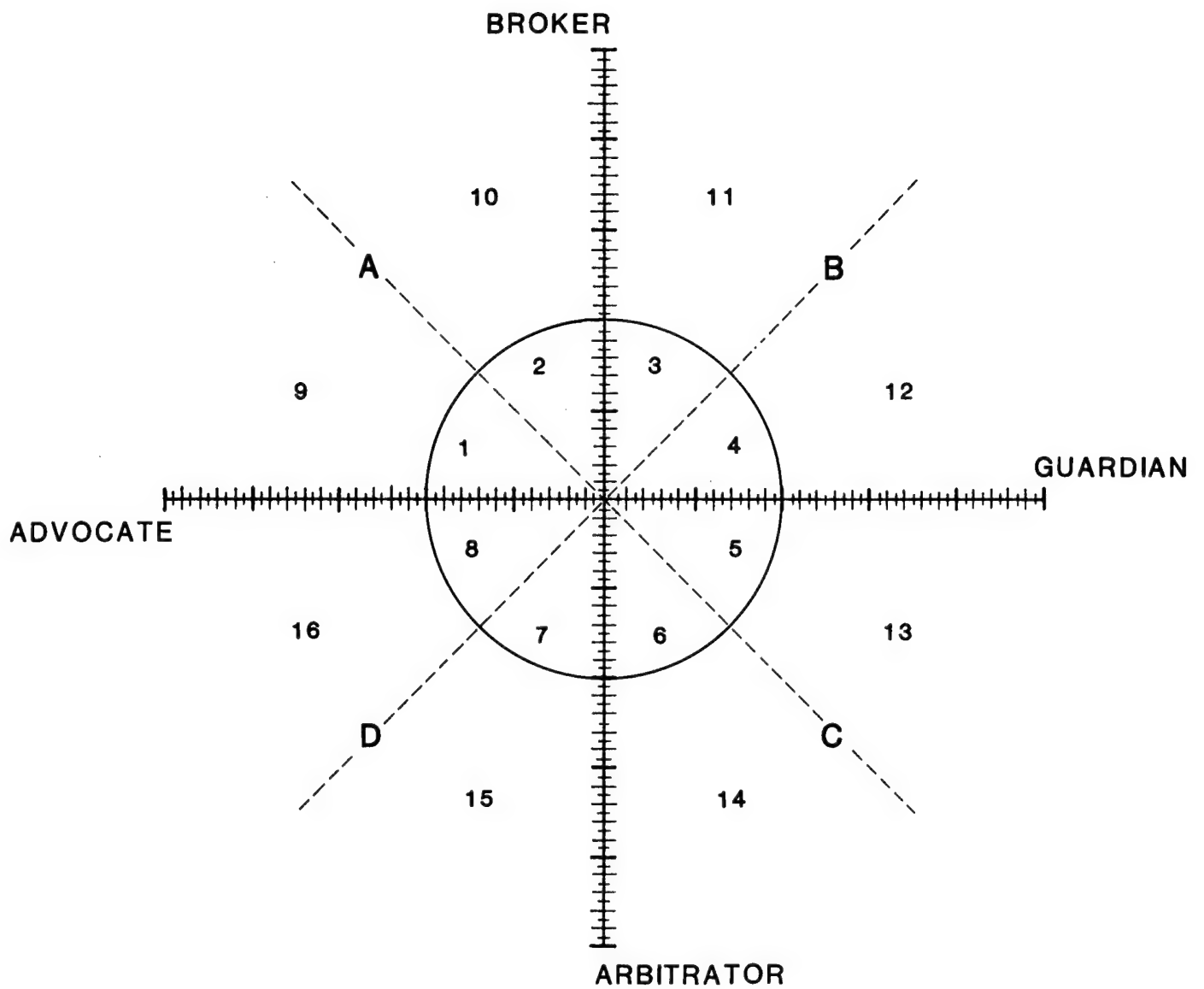


Figure 2. The 16 subquadrants (1-16) of an LIAM role map.

to keep or push the conflict into the distributive arena. Will be somewhat open to compromise.

Expected behavioral patterns for organizations located in each of the subquadrants 1-16 in Figure 1 are described in Appendix II. These descriptions reflect role intensities--or the degree to which an organization is likely to exhibit a certain pattern of behavior (in the above case, moderate behavior, rather than the extreme, is expected) as well as dominant role type (in this case, Advocate).

### Organizational Power

In addition to role indices, the questionnaire contains a series of questions related to organizational power. Organizational power in water resource issues (within the LIAM) exists in three major categories: Resources, Expertise, and Interest Group Support (Lamb and Doerksen 1978; Wilds 1986). A series of questions relating to each of these categories is presented to the analyst, who selects the most appropriate response for each question. The answers are scored, separated into categories, summed, and averaged to get an index for each category of power. The characteristics that make up each power index are listed in Table 2. (The questions which make up each index are contained in Appendix III.)

### Uses of the Model

LIAM can be used as a planning tool. By using LIAM, an analyst will be able to: determine the mix and distribution of organizational types in a given conflict; develop a better understanding of the conflict in general, and the other organizations involved; and determine the relative amounts and types of organizational power that a given organization will be able to use to influence the ultimate outcome. This information, in turn, can be used to develop appropriate communication and negotiation strategies for a given conflict.

This study was undertaken to examine the degree to which: (1) the questionnaire is adequately tied to and measures all relevant aspects of the theory upon which it is based; (2) respondents were able to apply the questionnaire consistently; (3) the questionnaire results actually predict subsequent behaviors; (4) the LIAM instrument permitted users to accurately discriminate among organizational types; (5) the theoretically drawn hypotheses held; and (6) the LIAM appeared to be a valid approach to understanding water resource conflicts.

## METHODS

The Legal-Institutional Analysis Model (LIAM) is an approach that offers users a way to assess a conflict, describe the organizations involved in that conflict, and examine the expected behavior of those organizations. This

Table 2. Characteristics contributing to organizational power.

---

1. RESOURCES

Statutory authority  
Public support  
Personnel  
Fiscal resources  
Frequency of involvement in such issues  
Intensity of involvement in such issues  
Owners and/or managers of resource  
Political support

2. EXPERTISE

Clarity of information  
Collects/disseminates information  
Uses information  
Respected experts in the field

3. INTEREST GROUP SUPPORT

Size of membership  
Frequency of involvement  
Group cohesiveness  
Popular support  
Organization  
Intensity of involvement  
Political skills and experience  
Prestige  
Awareness

---

overall approach involves a four-step process for assessing a conflict in order to prepare adequately for participating in its resolution. In addition, from this approach, a questionnaire was developed which analysts use to systematically evaluate a conflict. This questionnaire is based on the theoretical and behavioral postulates contained within the LIAM, and is the tool used to describe organizational participants in a particular conflict, and to predict the expected behaviors of those organizations. In order to examine the effectiveness of LIAM as a model, the degree to which the questionnaire is both reliable and valid must be examined. Since the questionnaire is a reflection of the LIAM, once these two tasks are accomplished, conclusions can be drawn about the LIAM as an approach to understanding, effectively communicating, and participating in the resolution of water resource conflicts.



Specifically, if it can be demonstrated that the questionnaire is adequately tied to and taps all important elements of the LIAM role and power types, that these role and power types are recognizable and applied consistently to a given set of resource organizations, that the LIAM behavioral predictions actually occurred in a particular setting, and that these results are replicable from one set of users to another, this will provide evidence that resource organizations do exhibit roles and that the behavioral continua contained in the LIAM are valid.

## RESEARCH DESIGN

A case study was used as a surrogate for direct participation in this conflict. The case study describes the development and negotiation of a resource conflict that was resolved in 1981 (Olive and Lamb 1984). The conflict revolved around the construction and operation of a major hydroelectric project on Terror Lake, Kodiak Island, Alaska. Twelve organizations participated in the negotiation and resolution of this conflict.

Prior to its selection, the case study was subjected to a content analysis by two coders. Neither coder was familiar with the LIAM. Each coder was given a general description of the four LIAM role types and a dictionary of words, phrases, and concepts to use in analyzing the case study. Each coder was asked to systematically read the case study and identify each word, phrase, or concept associated with the four role types, as well as the organization to which it referred. The results of the content analysis are contained in Appendix IV.

The content analysis was undertaken for two reasons: (1) to determine if the role types postulated in the model are observed in resource conflicts of the type described in the case study. If this is the case, objective coders should be able to categorize organizations according to the characteristics associated with the four major LIAM role types; and (2) to determine if the case study provided enough information to allow a robust LIAM analysis. That is, since the utility and accuracy of the questionnaire are expected to increase as the information or experience of the user increases, content analysis can provide a basis for comparing the distribution of scores for organizations about which there was a great deal of information with those about which there was little or none. In the latter case, the results (among respondents) should be less consistent: there should be more dispersion in the scores and more outliers. The two coders were able to categorize organizations using the LIAM concepts. More information was indeed provided in the case study for some organizations than for others (Appendix IV).

### Phase I: Non-Participant Observers (NPOs)--LIAM Analysis

Non-Participant Observers (NPOs) are study respondents who did not participate in the conflict being analyzed. Personnel in the Regional and Field offices of the U.S. Fish and Wildlife Service (Service) were asked to participate in the LIAM analysis as NPOs. The rationale for soliciting Service personnel to participate in this analysis is that the LIAM was developed by staff of the National Ecology Research Center (NERC), a research and

development arm of the Service, as a planning aid for operational units of the Service. Therefore, this study focused on a sample of those individuals for whom the model was intended. Although the main focus of this effort was on Service personnel, some non-Service participants were included. The need for volunteers was advertised in various newsletters sent out to over 5,000 people. Of the 48 NPOs who volunteered to participate in this study, 34 were employed in professional positions in FWS Regional and Field offices, and 14 were from Minnesota State resource management agencies.

Each NPO was sent the following materials: (1) a list of participating organizations, five of which were randomly assigned to each NPO to analyze; (2) the case study; (3) the LIAM questionnaire; and (4) a set of instructions. (Appendix V contains the NPO cover letter and instructions, a copy of the case study, and a list of involved organizations.) The NPOs were asked to read the case study and conduct an LIAM analysis of each of the assigned organizations. The results of the analysis were examined to determine the amount of consistency achieved among respondents for these organizations. These results were also compared with those obtained in the second stage of this study.

#### Phase II: Participant Observers (POs)--LIAM Analysis

In this phase of the study, those organizations and individuals described in the case study were contacted to participate in an LIAM analysis. Although the set of respondents was different, the organizations and instrument of analysis were the same.

Participant Observers (POs) are individuals who directly participated in the resolution of the case study. An attempt was made to contact all individuals who were major participants in this negotiation. All potential POs had direct knowledge of the negotiation, issues, and organizations involved. Each PO was asked to analyze all 12 organizations using the LIAM. (The cover letter and instructions developed for the POs are in Appendix VI). The results were examined to determine the degree of consistency among these respondents, and between these respondents and those participating in the previous LIAM analysis (NPOs versus POs).

#### Phase III: Participant Observers--Matching Exercise

After the LIAM questionnaire data were returned by the POs, these individuals were asked to complete a second task. Each was sent: (1) a definition of the behavioral patterns associated with each of the 16 sub-quadrants on the LIAM role map (see Appendix II); (2) a list of the 12 organizations that participated in the conflict (the hydroelectric project on Kodiak Island, Alaska); and (3) an LIAM role map. The POs were asked to read the behavioral patterns associated with each of these descriptions, and to match each organization with one of the behaviors based on the POs' direct experience with the organization during the Terror Lake negotiation (see Appendix VII).

Background information was collected on the Phase II respondents.<sup>1</sup> Each respondent was sent a short biographical data form to complete and return with the LIAM data. (The Biographical Data Sheet is presented in Appendix VIII.) These data were collected to determine whether or not personal variables, such as education and professional experience, help explain any observed variance in the LIAM analyses among the respondents.

## LIAM QUESTIONNAIRE DESIGN

The LIAM questionnaire is similar in design to psychological tests used to assess individual personalities (e.g., Edwards 1970; Fiske 1971, Lanyon and Goodstein 1971; Klein 1983). "Personality assessment" is the process of gathering and organizing information that will lead to better understanding, and serve as a basis on which to make predictions about behavior (Lanyon and Goodstein 1971). In assessing organizational "personalities," researchers must rely on individual analyses of the organizations in question. In psychological research, this is akin to assessing individuals by relying on other people's evaluations rather than asking them to evaluate themselves.

Typically, a number of steps are taken in the development of a tool of this type, all of which are driven by a set of theoretical propositions, in combination with the observations and professional judgment of the investigator. Based on the relevant theories, characteristics of interest are identified, along with the behavioral patterns associated with these characteristics. Questions are developed to measure the characteristics, and predictions are made about expected behavior. Once the questions are developed, the researcher determines the degree to which they actually measure what they were designed to measure and whether or not the behavioral predictions actually occur (Lanyon and Goodstein 1971; Nachmias and Nachmias 1981; Kline 1983).

## RELIABILITY OF THE QUESTIONNAIRE

According to Nachmias and Nachmias (1981), reliability is an indication of the extent to which a measure contains "variable errors," errors that vary from time to time for a given set of variables measured twice by the same instrument. A questionnaire is said to be reliable if it is self-consistent, and if the scores are basically the same on retesting (Kline 1983). Bailey (1982) also focuses on score consistency; for this writer, the reliability of a measure can be found in its ability to yield the same responses to questions administered twice, either at the same time or different points in time.

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<sup>1</sup>An attempt was made to collect biographical information on Phase I respondents (NPOs) also; however, not all NPOs returned the data sheets. In addition, while most POs analyzed all 12 organizations, many NPOs only analyzed 1 or 2. Thus, there was not enough information for a comparison of NPOs in this study.

Typically, reliability is tested using one of three methods. With the test-retest method, the same respondents are given the questionnaire at two or more points in time. The results are then correlated, to determine the degree to which they are the same. With the parallel forms technique, two separate instruments are used, each of which measures the same variables, and the results correlated. With the split-half method, an investigator develops twice as many questions to measure the same characteristic. The responses are then randomly divided into two sets (usually odd- versus even-numbered questions), and the results are correlated. In each case, a correlation coefficient of .80 or better is considered evidence that the instrument is reliable (Kline 1983). If the same questions are inserted into a questionnaire twice, however, they are likely to be interpreted by the respondents as "trick questions." Furthermore, having the same respondent or set of respondents take a questionnaire twice in a short period of time is also likely to bias the second set of results (Bailey 1982). Indeed, there are many sources of error that can contribute to score variation from one measurement to the next (Kleinmuntz 1967).

"Consistency" is the measure of reliability used in this study; it is defined as the degree to which an LIAM questionnaire analysis yields similar results among the same set of individual respondents, and between two different sets of respondents. In tests of reliability for inventories designed to assess individual personality traits, it is important to have the same set of individuals take the test twice. In this case, the unit of analysis is the organization (as perceived by individuals). Thus it seemed reasonable to have two different sets of respondents analyze the same set of organizations, in largely the same context. Comparisons could then be made both within and between analyses.

If an instrument is reliable, it will produce results that are consistent among a given set of respondents, and between different sets of respondents, when the objects of analysis are the same. The reliability of the LIAM instrument is examined in three ways. First, the data from the Phase I analysis are reproduced in the form of box plots.<sup>2</sup> Boxplots provide graphically simpler and more meaningful summaries of grouped data than do histograms. In addition, the boxplot makes it possible to compare data from several groups on the same scale. Boxplots were chosen because they provide

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<sup>2</sup>A box plot is an effective way to summarize and describe a batch of data (McGill, Tukey, and Larsen 1978:12-16; Velleman and Hoaglin 1981:65-92). Five values from a data set are typically displayed in boxplots: the extreme scores, the upper and lower hinges (or quartiles), and the median (McGill, Tukey, and Larsen 1978). Each hinge or end quartile contains 25% of the data, while the box contains the other 50% of the distribution. The whiskers of the boxplot denote the adjacent outermost values, while outside values (apparent outliers) are signified by an asterisk; extreme outliers are denoted by an "O." The median score is represented by a vertical line through the box. Parentheses, which define a confidence interval around the median, are also printed on boxplot displays. The grouped boxplot display is a graphical analog to one-way analysis of variance.

the means to visually inspect and interpret the data. By constructing boxplots for each organization in each analysis, the overall consistency of the scores for a given organization on specific variables can be examined visually. In addition, the underlying patterns of an analysis and the distribution and patterns between two or more analyses can be compared.

Boxplots were constructed for each organization analyzed in Phase I, for each of the seven variables of interest: four role types (Broker, Arbitrator, Advocate, and Guardian) and three categories of power (Resources, Expertise, Support). By examining these boxplots, one can get a clear picture of the dispersion of the data for the Phase I respondents (NPOs) in their analyses of each organization (and hence, the reliability of the instrument).

Boxplots were also drawn for the Phase II data (POs). Both sets of boxplots were used to describe the distribution of data for each organization on each of the seven variables. The two sets of boxplots for Phase I and Phase II data also were compared, to determine if the underlying pattern and direction of the data are similar between the analyses.

Second, the two sets of data were statistically compared to determine whether or not the two analyses yielded identical results. This was done using the Mann-Whitney statistic to test the null hypothesis that the two data sets are identical ( $P \geq .95$ ). The Mann-Whitney test is a nonparametric procedure for the comparison of two groups.<sup>3</sup> It is also appropriate for the analysis of ordinal or ranked data, and does not assume the data are normally distributed or that the groups have equal variances (Conover 1980; Agresti 1984). Acceptance of the null hypothesis would demonstrate that the two data sets are identical.

Third, the scores obtained for each role and power variable in Phase I were correlated (by organization) with the same scores obtained in Phase II, using Spearman's rank correlation coefficient. This statistic is often used as a nonparametric test of independence between two variables (Conover 1980). If the instrument is reliable, the coefficients obtained in correlating Phase I scores with Phase II scores should be positive and significant (at  $P \leq .05$ ).

In many instances in the social sciences, validity evidence is almost entirely lacking, or at least difficult to come by. Many researchers tend to fall back entirely on reliability (Nachmias and Nachmias 1981). Yet an instrument may be reliable, and produce results that are not at all valid. In the case of LIAM, both sets of concerns are examined.

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<sup>3</sup>Kolmogorov-Smirnov tests and stem and leaf diagrams showed that these data are not normally distributed. Therefore, nonparametric statistics were used in this study. The results of similar analyses using parametric statistics, however, were virtually identical to the results obtained using nonparametric equivalents.

## VALIDITY: THE QUESTIONNAIRE AND THE MODEL

Validity refers to what an instrument measures and how well it predicts (Kleinmuntz 1967). Four kinds of validity can be distinguished, each of which focuses on different aspects of measurement: content validity, empirical or criterion validity, construct validity, and cross-validity (Kleinmuntz 1967; Fiske 1971; Nachmias and Nachmias 1981; Bailey 1982; Kline 1983).

### Content Validity

Content validity is typically divided into two subcategories: face validity and sampling validity. Face validity is concerned with whether or not a questionnaire appears (on its "face") to measure what it was designed to measure. Sampling validity concerns the degree to which the instrument appears to adequately represent the characteristics postulated by theory to be relevant to behavior. In both cases, the investigator uses professional judgment--both his own and that of other specialists--to make this determination. It is partially a definitional and semantic judgment, and is totally subjective (Bailey 1982). Both of these definitions are appropriate for this study, and both aspects of content validity were examined.

A major problem with content validity is that there are no replicable rules for making this determination; thus it is the weakest form of validity, and typically, the easiest to document (Nachmias and Nachmias 1981). It does serve a useful function in the process of developing a valid questionnaire, however. Content validity is especially relevant to an instrument intended to reflect theory, as is the case with LIAM (Kleinmuntz 1967). Although content validity is a necessary condition for constructing a useful questionnaire, it is not a sufficient one.

In this study, the degree to which the LIAM and the questionnaire appear to have face and sampling validity was determined in part by the subjective evaluation of the investigator. LIAM and the questionnaire both were also subjected to pretesting and review by other professionals. In the case of the LIAM, a panel of experts was asked to review the theoretical underpinnings of this approach, the four role types, and the 16 behavioral descriptions associated with different combinations of role types (see Appendix IX). The questionnaire was pretested and evaluated by a number of professionals in the area of water resource management and survey research methods.

Other aspects of a model, and the instrument it uses as a measuring device, must be examined. That is, the LIAM postulates that each organizational type will emit a specific behavioral pattern, and the questionnaire is used to make behavioral predictions for an organization. Thus, the degree to which the questionnaire allows users to accomplish this goal, on the one hand, and the LIAM predictions that are actually observed, on the other hand, must be examined.

### Empirical Validity

Empirical validity (sometimes referred to as criterion validity) concerns the relationship between the measuring instrument and the results obtained

from its application. To demonstrate empirical validity, an investigator provides evidence that a relationship exists between scores on a measure and actual behavior (Kleinmuntz 1967). For example, an investigator might compare questionnaire scores with other measures of the same characteristics (Kline 1983). The other measures are taken either at the same time (concurrent validity) or at a later date in time (predictive validity) (Kline 1983). Since it is not always feasible to administer two questionnaires to the same set of respondents during the same time period, predictive validity is the most widely used test of empirical validity (Kline 1983).

This study focuses on the predictive validity of the LIAM. No other instrument exists for measuring these organizational characteristics, however. The LIAM model does predict organizational behavior, based on the results of a questionnaire analysis. These behavioral predictors are used as the extra-test criterion for evaluating the predictive validity of the instrument. The key question here is: Are the results of an LIAM analysis an accurate prediction of subsequent organizational behavior?

Phase II respondents (POs) completed two separate tasks in this study. First, each PO analyzed the organizations that were involved in the Terror Lake conflict using the LIAM questionnaire. The results of these analyses were used to locate each organization on an LIAM role map, using the mean role scores for each organization. Because each LIAM subquadrant has an associated set of expected behaviors, an organization's location on the role map provided a set of expected behaviors for that organization. In the second task, the POs were asked to select the behavioral pattern which most accurately described an organization's actual behavior in the conflict, and to locate each organization on an LIAM role map. The two sets of results were compared to determine the degree to which the expected and observed behaviors were similar.

#### Construct Validity: Group Differentiation and Hypothesis Testing

The concept of construct validity is variously defined by different writers on the topic. For Nachmias and Nachmias (1981:144-145), construct validity involves "relating a measuring instrument to an overall theoretical framework in order to determine whether the instrument is tied to the concepts and theoretical assumptions that are employed." Typically, this involves four related tasks: "(1) proposing that the instrument measures certain properties, (2) inserting that proposition into a body of theory about those properties, (3) predicting other properties that should be related to the instrument as well as properties that should have no relation to the instrument, and (4) collecting data to confirm or reject those hypotheses" (Nachmias and Nachmias 1981:144-145).

Bailey (1982:71-72) offers an example for his definition:

Imagine that we construct two indices of social class. Assume we have a theory that contains a proposition stating an inverse relationship between social class and prejudice: as social class increases, prejudice decreases. Assume further that this proposition has been tested by measuring social class by index 1, and has been substantiated. Construct validity consists of replacing index 1



with index 2 in the theory and retesting the entire theory. If we get the same results for the whole theory . . . then we say that the new measure has construct validity.

In tests of construct validity, as defined above, both the instrument and the theory underlying it are simultaneously tested.

Kline (1983:14) asserted, however, that evidence for construct validity can be found by drawing "theoretically relevant" hypotheses for questionnaire scores, hypotheses that are generated from the nature of the characteristics of interest. One problem with construct validity for Kline is that, ultimately, it is more subjective than objective. Thus, the rationale of the hypotheses must be clearly stated.

Kleinmuntz (1967) views construct validity differently than the others. For him, construct validity is demonstrated in two steps. First, the investigator makes predictions regarding the variation of scores from person to person or occasion to occasion, and second, gathers evidence to confirm those predictions. One method recommended by Kleinmuntz to test construct validity is "group differentiation". If scores on a series of questions do not reflect differences between well-defined sets, then the instrument may not be a valid one. The differences must be as expected, given the theoretical framework on which the instrument is based. Nachmias and Nachmias (1981) also make reference to a similar test of construct validity: convergent-discriminant validity. In this case, intercorrelations among different measuring instruments are made. Different methods for measuring the same property should yield similar results, and different properties should yield different results regardless of the measuring instrument. The two tests of construct validity used in this study are those described by Kleinmuntz and Kline. That is, the construct validity of the LIAM questionnaire is tested by: (1) examining the ability of the instrument to differentiate among organizational types, and to do so in an intuitively and theoretically sound direction; and (2) drawing theoretically relevant hypotheses for the scores, and testing those hypotheses.

To determine whether or not the LIAM questionnaire permits users to correctly discriminate among different organizational types, there must be evidence that the instrument yields different results for different organizational types, and that these results are appropriately different from organization to organization. Two methods were used to make this determination.

First, the boxplots constructed from both Phase I and Phase II data were examined, to get a picture of the degree to which the organizations are different from one another. Second, the data (grouped by organization) in Phase I and Phase II were subjected to a Kruskal-Wallis one-way analysis of variance to reject or accept the null hypothesis that the analyses of the 12 organizations are identical to one another ( $P \leq .05$ ). Like the Mann-Whitney test, the Kruskal-Wallis test is appropriate for the analysis of ordinal or ranked data, and does not assume the data are normally distributed or that the groups have equal variances (Conover 1981). The Kruskal-Wallis test is appropriate for comparing three or more groups. Rejection of the null



hypothesis would indicate that the LIAM instrument allows respondents to discriminate among organizational types because the analyses of these organizations are different from organization to organization.

The determination of whether or not the discriminations were in the appropriate directions is based on the observations and professional judgment of the investigator, as well as observations and comments provided by individuals who were direct participants (POs) in the resolution of this conflict. For example, one would not expect development organizations (such as a utility company) to be categorized as strongly pro-environmental. Conversely, one would not expect an organization whose mission is directly tied to environmental protection to be categorized as pro-development. If this turns out to be the case for any organization analyzed in this study, one might well question the construct validity of this instrument.

In the second measure of construct validity, four theoretical hypotheses about the LIAM scores were drawn and tested. Specifically, the LIAM contains two behavioral continua, along which organizational preferences and characteristics can be arrayed. These preferences and characteristics are associated with specific patterns of behavior. The first continuum was developed as a function of differences among organizations in their preference for a particular type of decisionmaking environment. At each end of this continuum lies an opposite role type; that is, an extreme Broker is the polar opposite of an extreme Arbitrator. The second continuum was developed as a function of differences among organizations in their preference for a particular type of outcome. Thus, an extreme Advocate is hypothesized to be the polar opposite of an extreme Guardian. If this is true, then the Broker scores for these organizations should be inversely and significantly correlated with the Arbitrator scores, and the Advocate scores should be inversely and significantly correlated with the Guardian scores.

Spearman's rank correlation technique was used to test the null hypothesis that the first two variables (Broker and Arbitrator) are mutually independent, against the alternative hypothesis that the variables are inversely related. The same null hypothesis was tested for the second pair of variables (Advocate and Guardian).

This statistical test also was used to determine if any relationships exist between the role and power variables. Wilds (1986) suggested that preference to operate in either decision arena will be shaped in part by an organization's ability to exert influence in one arena over the other (regulatory vs. distributive). Furthermore, organizational resources are hypothesized to be highly influential in the distributive decisionmaking arena, while the possession of technical and scientific data is thought to be more relevant in the regulatory arena (Wilds 1986). If this is the case, there should be a positive and significant relationship between Organizational Resources and the Broker role type, and between Organizational Expertise and the Arbitrator role type for a given organization. The third category of power, Interest Group Support, is hypothesized to be independent of either role type (Wilds 1986). The same null hypothesis of no relationship or mutual independence was tested against the alternative hypothesis that there is a tendency for the larger values of X and Y to be paired together.

The different types of validation described herein, from face validity to construct validity, can be seen as a progression or accumulation of evidence substantiating the validity of a questionnaire (Bailey 1982). In addition to the three types of validity detailed above, one writer described yet another type of validity.

### Cross-Validity

According to Kleinmuntz (1967), none of the other methods of validation can serve as a substitute for cross-validation. In cross-validation, an investigator conducts a second study in which the questionnaire is given to a second sample in the same or a similar context. The second set of individuals should be similar to the first. A comparison is then made between the two sets of results. The two sets of scores should not be significantly different. The methods for cross-validating a questionnaire are identical to those for testing reliability. However, the conclusions are different. Since an LIAM analysis is conducted by individual respondents, the greater the degree of consistency of those evaluations between different sets of respondents, the more one is in a position to conclude that the traits being measured are valid. For example, if a number of individuals consistently describe another person as having characteristic "X," one may, over time, reasonably conclude that the combined assessment of that person is fairly accurate. The same logic applies to the cross-validation of organizational roles in this study.

The LIAM questionnaire was cross-validated by having two different sets of respondents (NPOs and POs) analyze the same organizations in largely the same context. Comparisons of the two sets of results were made using boxplots, the Mann-Whitney test, and Spearman's rank correlation coefficient. Although these are the same tests used to evaluate reliability, different kinds of conclusions were drawn based on the results. That is, boxplots, Mann-Whitney, and Spearman's tests were used to examine the degree to which the results were consistent between the Phase I and Phase II respondents.

### INDIVIDUAL BIAS: CLUSTER ANALYSIS

Cluster analysis was performed on the individual respondents in Phase II to determine if there were any identifiable clusters of individuals that help explain observed differences among individual LIAM analyses. Cluster analysis is a generic name for a variety of mathematical methods that can be used to find out which objects (in this case, individuals) are similar. Methods of cluster analysis follow a prescribed set of steps. The four major steps involved include: (1) the collection and organization of a data matrix whose columns represent the objects to be cluster-analyzed and whose rows are the attributes that describe the objects, (2) optional standardization of the data matrix, (3) the computation of the values of a resemblance coefficient to measure the similarities of all pairs of objects, and (4) the selection and use of a clustering method to process the values of the resemblance coefficient. This results in the production of a diagram called a tree or dendrogram, which shows the hierarchies of similarities among all pairs. From the tree, the clusters can be read (Romesburg 1984).

Cluster analysis of the data obtained from the POs will show if the data are similar (or dissimilar) along a given attribute or set of attributes of the individual. In this study, the attributes of interest, which may affect the way in which respondents perceive and analyze organizations using the LIAM include: age, income, professional training/background, private versus public sector employment and experience, among others (see Appendix VII).

## RESULTS

### DATA COLLECTION: PHASES I, II, AND III

All of the FWS Field Offices, as well as FWS Fisheries Laboratories, were contacted for volunteers to serve as NPOs in Phase I, the case study application of the LIAM. Non-Service volunteers were also accepted. Forty-eight respondents agreed to participate. Each NPO read the case study and analyzed one or more of the organizations described in it, using the LIAM questionnaire. The number of NPOs analyzing each of these organizations varied from 6 (for the U.S. Department of the Interior) to 13 (for Western Alaska Ecological Services). Half of the organizations were analyzed by 10 NPOs each.

In addition, 25 individuals were identified as potential POs for participation in the Phase II data collection of this study. Subsequent telephone interviews with several key participants resulted in the elimination of five of these potential respondents because they did not actually participate in the Terror Lake project. Of the remaining 20, 2 had no access to a computer and 4 could not be reached. The remaining 14 agreed to do the analysis, and the PO materials were forwarded to each. Seven data sets were returned. Not all of these data sets were complete, however. Some POs declined to analyze organizations they believed were only peripheral players in the resolution of the conflict. Table 3 lists all 12 organizations, along with the number of NPOs and POs who analyzed each organization.

In the Phase III data collection of this study, the seven POs were sent a second exercise to complete, at least 2 weeks after the Phase II materials were returned. The POs were asked to select the behavioral pattern which best described each organization's behavior during the Terror Lake conflict. Six of the seven POs completed this exercise.

### RELIABILITY OF THE QUESTIONNAIRE

The reliability of the LIAM questionnaire was examined in three ways.

#### Phase I and II: Role Boxplots

Boxplots were drawn for each role variable: Broker, Arbitrator, Advocate, and Guardian. If the role indices are reliable, the NPOs should agree in their analysis of a given organization on all four variables. In addition, the two LIAM analyses should not be significantly different since both the

Table 3. List of organizations and number of respondents (Terror Lake conflict).

Organization	NPOs	POs
Alaska Department of Fish and Game (ADFG)	n=10	n=6
Alaska Power Authority (APA)	n=9	n=7
U.S. Bureau of Land Management (BLM)	n=8	n=5
Alaska Department of Natural Resources (ADNR)	n=10	n=7
U.S. Department of the Interior (DOI)	n=6	n=6
U.S. Fish and Wildlife Service, Alaska Regional Office, Ecological Services (FWS-ES)	n=10	n=7
Federal Energy Regulatory Commission (FERC) (Formerly the Federal Power Commission - FPC)	n=10	n=7
Alaska Department of Fish and Game, Fisheries Resources, Enhancement Division (FRED)	n=7	n=6
Kodiak Electric Association (KEA)	n=10	n=7
Kodiak National Wildlife Refuge (Refuge)	n=10	n=5
U.S. Fish and Wildlife Service, Regional Office Division of Refuges (DOR)	n=9	n=6
U.S. Fish and Wildlife Service, Western Alaska Ecological Services (Ecological Services Field Station) (WAES)	n=13	n=5

NPOs and POs analyzed the same set of organizations in the same conflict. If this is the case, the instrument was interpreted and applied similarly among both groups of respondents, and between the two LIAM analyses. If the questionnaire is unreliable, no pattern should emerge in the distribution of the data for these organizations on these variables. The boxplots would, in that case, be quite long; there would be numerous and extreme outliers; no sensible pattern would be apparent; and the underlying patterns of the NPO and PO boxplots would be obviously different from one another.

Close examination of the boxplots constructed from each data set reveals the degree to which this is the case. In Figure 3, NPO Broker and Arbitrator scores are represented in boxplots, by organization, for the seven major organizational participants in this conflict.<sup>4</sup> The Advocate and Guardian scores are represented in Figure 4.

In Figure 3 (Broker-Arbitrator variables) there is quite a bit of scatter within each boxplot for three of the seven organizations on both role variables: FERC, DOR, and FWS-ES. In the DOI boxplot, the scatter is almost nonexistent, although there is one adjacent outlier in the arbitrator scores for this organization. Adjacent outliers are shown as asterisks and represent those scores that are adjacent to--but outside of--both the boxplot whiskers and the confidence intervals (indicated by parentheses) around the mean. Extreme outliers are indicated by a zero (there are none in Figure 3). For the other three organizations (KEA, Refuge, and WAES), the scatter is minimal, indicating agreement among the NPO's in their evaluations of these organizations.

In Figure 4, there is more consistency among the NPOs in their evaluations of FWS-ES, Refuge, and WAES on these two variables (Advocate-Guardian); for the rest of the organizations in this figure the amount of scatter is about the same as on Figure 3. Overall, the boxplots are longer for the Broker-Arbitrator variable than the Advocate-Guardian variable, even though the latter diagram contains more outliers. There are several possible explanations for this fact.

First, the Broker and Arbitrator questions may not allow users to distinguish among organizations for these two role types. If this were the case, however, the Kruskal-Wallis test on these data should fail to reject the null hypothesis that the results are identical for all organizations regardless of the innate differences between them. The probability values for the data are reported at the bottom of each figure, and in each case, approximate zero. That is, the probability of rejecting the null hypothesis when it should be accepted is approximately zero. The LIAM instrument apparently allows users to discriminate among different types of organizations, even in this behavioral dimension.

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<sup>4</sup>Although 12 organizations were initially identified as participants in the Terror Lake conflict, the content analysis of the written case study revealed that very little information was provided for five organizations: the Alaska Department of Fish and Game; the Alaska Power Authority; the Bureau of Land Management; the Alaska Department of Natural Resources; and Fisheries Resources-Enhancement Division. Thus boxplots for these organizations are not included in this analysis, nor were these groups reported in any other analysis. However, when boxplots were constructed for all 12 organizations analyzed by the NPOs, more dispersion of data and numerous outliers were observed for the five organizations about which there was little information for the NPOs to utilize in their analysis. Thus it appears that as information increases, so does the ability of users to reliably assess a conflict, at least as measured by the consistency among respondents in their analyses of these organizations.

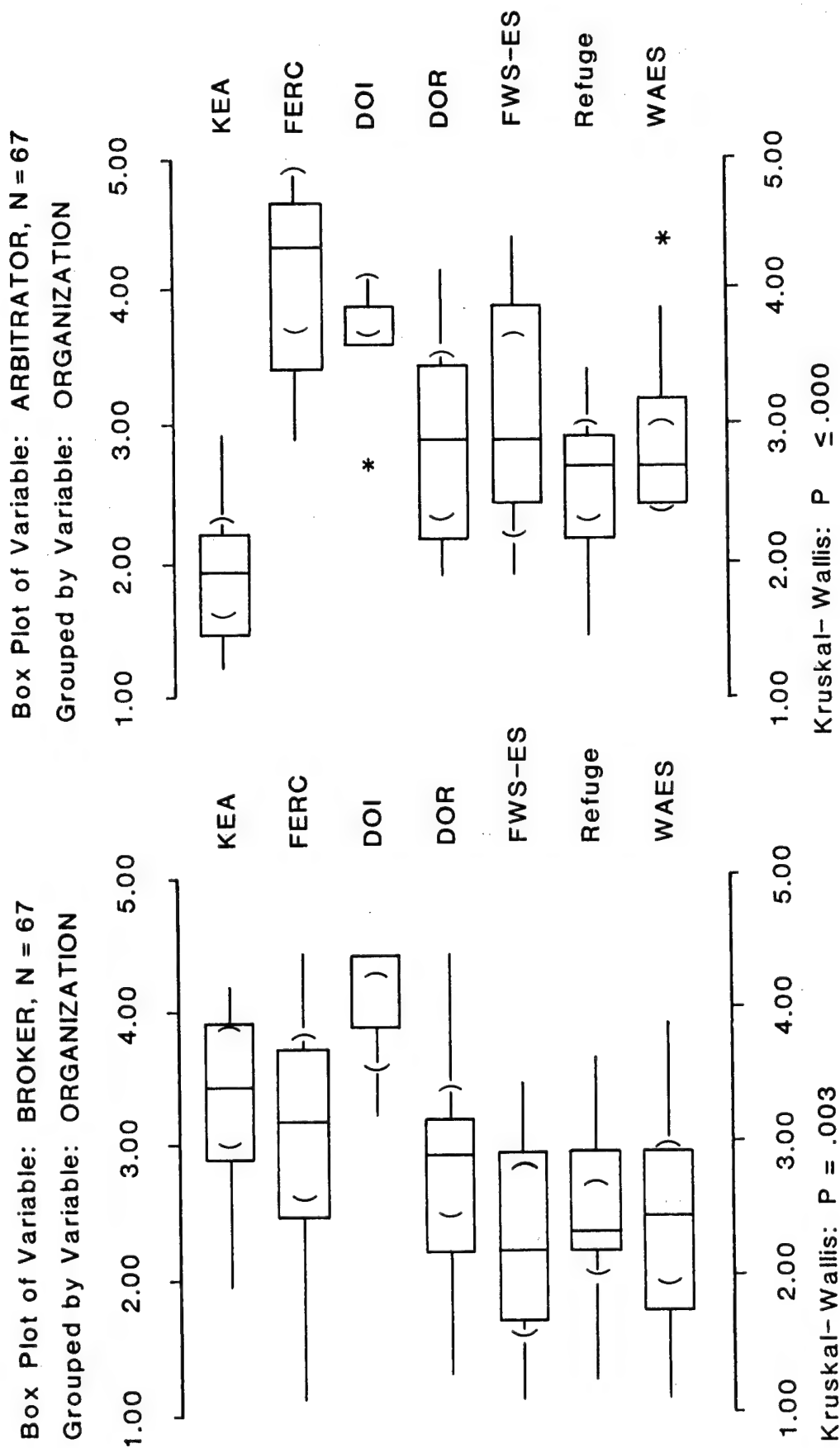
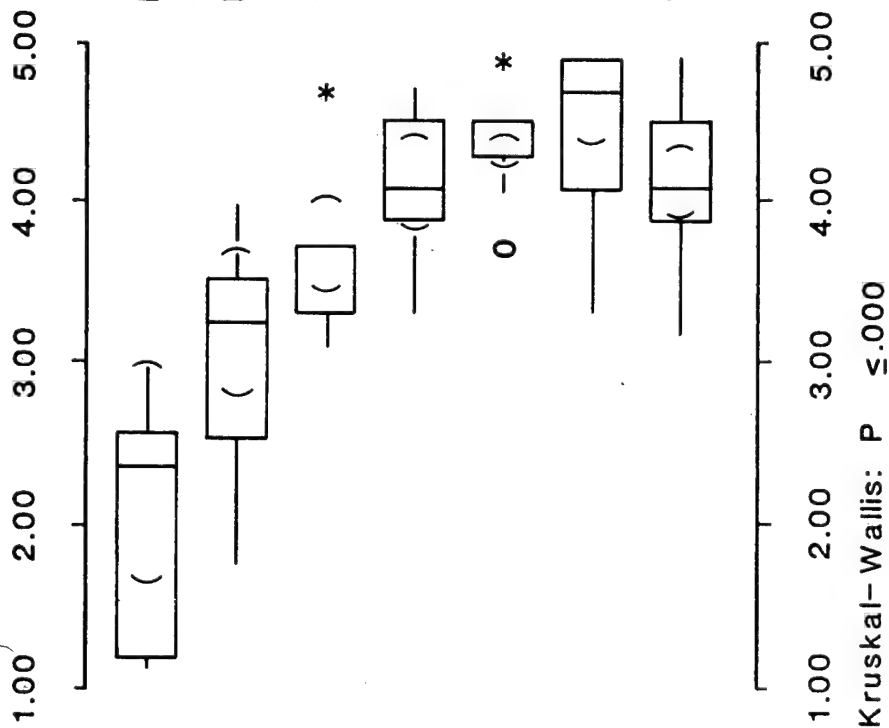


Figure 3. Phase I (NP0) role boxplots, Broker-Arbitrator variables (7 organizations).

Box Plot of Variable: ADVOCATE, N = 67  
Grouped by Variable: ORGANIZATION



Box Plot of Variable: GUARDIAN, N = 67  
Grouped by Variable: ORGANIZATION

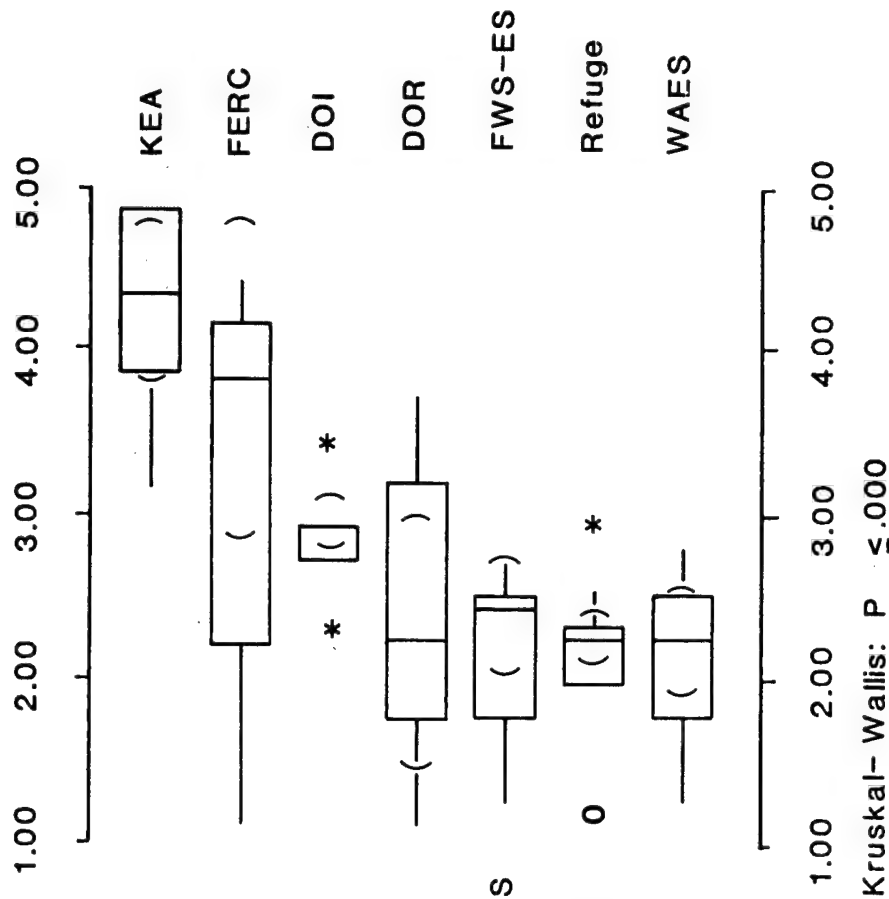


Figure 4. Phase I (NP0) role boxplots, Advocate-Guardian variables (7 organizations).

A second possible explanation may be found in the case study itself. Perhaps organizational preferences for one decision arena over the other are not as obvious as preferences for outcome. While the two coders were able to identify the characteristics associated with Brokers and Arbitrators in their reading of the case study, they did so by systematically looking for the correct indicators. Individuals reading the case study without that degree of concentration or specific guidelines may have been unable to do so readily as the coders.

A third possible explanation is that the assessment of these organizations in both behavioral dimensions was correct. The organizations may have had strong preferences for a particular type of outcome, which tended to overshadow the more moderate preferences to operate in a particular type of decision environment. Certainly none of the categorizations in this dimension contradicts what could be intuitively expected. Examination of the PO role boxplots may help answer this question. The POs did not need to obtain information from the case study; they were direct participants in the resolution of this conflict. If the results of the second LIAM analysis are more or less the same as the first analysis, the third possibility would gain credence.

Figures 5 and 6 contain role boxplots constructed from the PO LIAM analysis, for the seven organizations identified by the POs as major participants.<sup>5</sup> The overall pattern of these boxplots is remarkably similar to the results for NPOs reported in Figures 3 and 4. The major difference between the two analyses is that, in most instances, the POs were more consistent than the NPOs in their analyses as indicated by the smaller widths (i.e., less scatter) of the boxplots. This is not surprising, since the NPO analysis was based on a case study, while the POs drew on personal experience. In addition, although the number of outliers in Figure 3 increased from two to three in Figure 5 (Broker-Arbitrator variables), and two of the three outliers in Figure 5 are extreme, the number of outliers in Figure 6 decreased substantially, to three from seven in Figure 4 (Advocate-Guardian variables).

The data for the FWS-ES and the ADNR are widely dispersed on the Broker-Arbitrator continuum. The POs did not agree in their assessments of these two organizations in this dimension. Two POs suggested that the ADNR was not a key player and should have been excluded from this analysis; indeed, one PO indicated that the ADNR did not become even a peripheral player until towards the very end of the conflict. The dispersion of data for this organization may be a reflection of this fact.

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<sup>5</sup>The POs indicated that, of the 12 organizations each was asked to analyze, five were peripheral players at best: the Bureau of Land Management; Fisheries Resources-Enhancement Division; the Department of the Interior; the Alaska Power Authority; and Western Alaska Ecological Services. These organizations were thus removed from this analysis. The same reduction in error was observed in this case as was reported in footnote 1 for the NPO data.



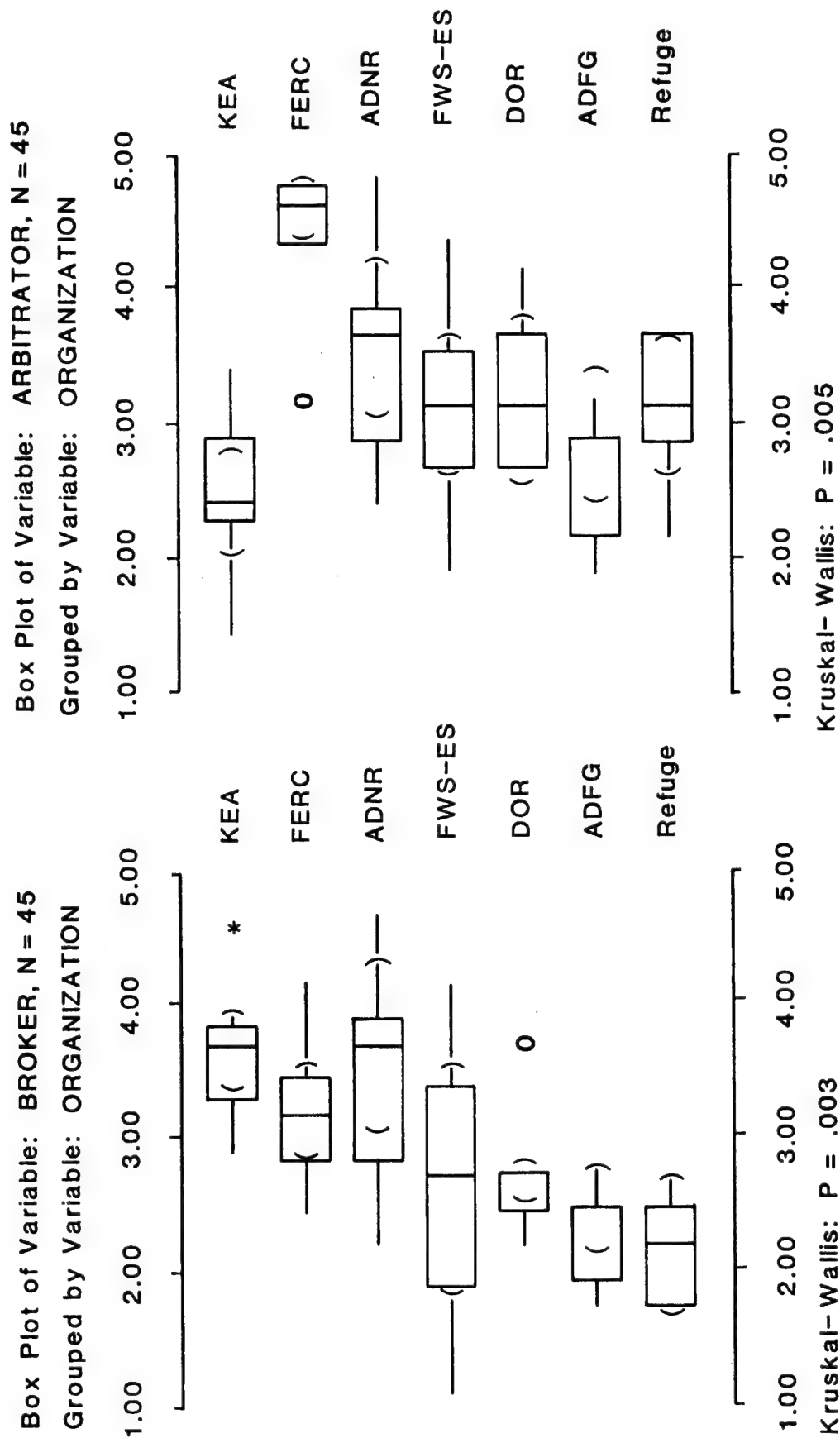


Figure 5. Phase II (P0) role boxplots, Broker-Arbitrator variables (7 organizations).

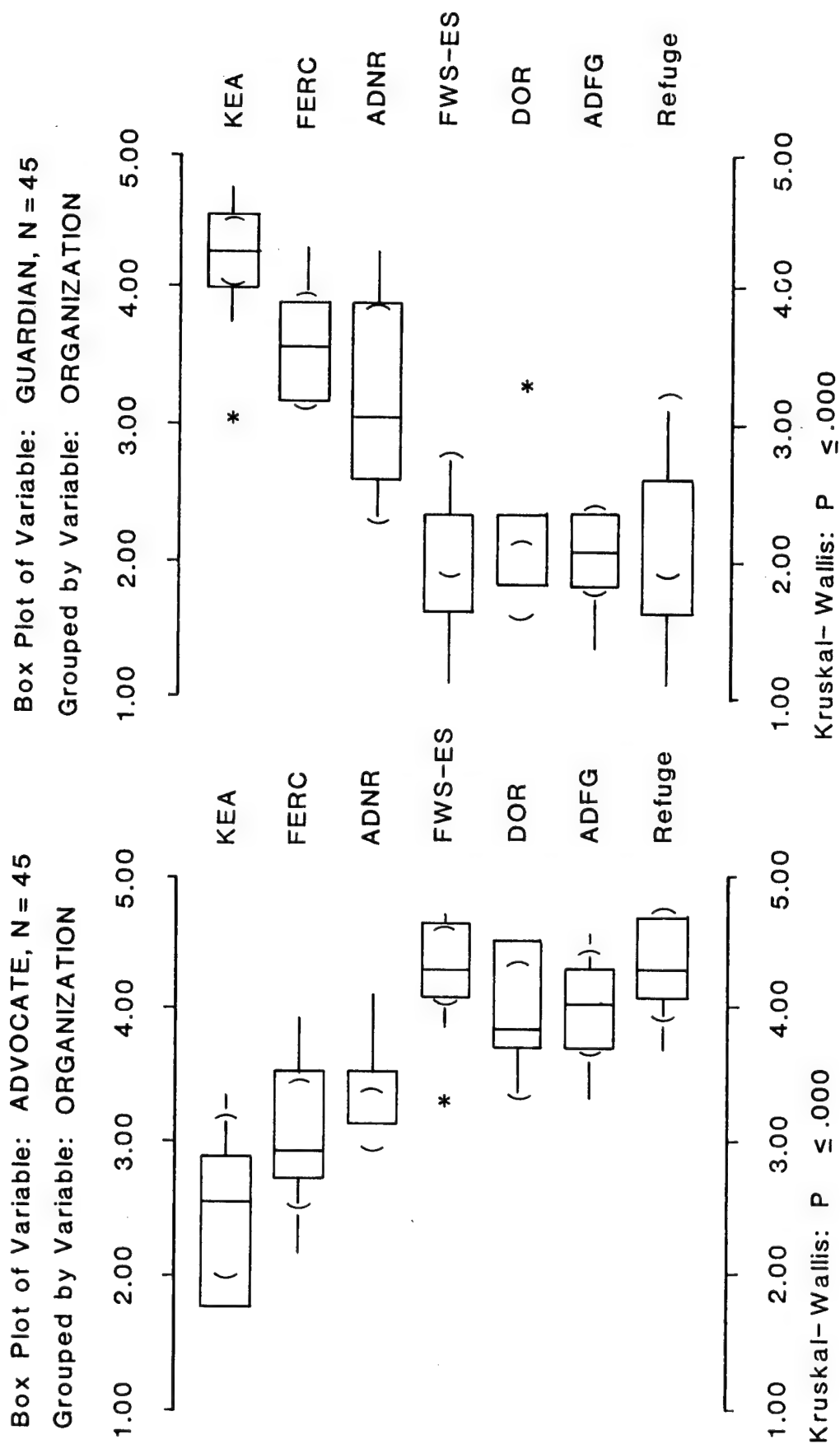


Figure 6. Phase II (P0) role boxplots, Advocate-Guardian variables (7 organizations).

In the case of the FWS-ES, another explanation is plausible. The FWS Regional office in Alaska is a large organization with many subunits. Perhaps the scatter for this organization reflects the fact that the respondents focused on different subunits when answering the questionnaire. For example, one PO stated that he focused on the Regional Director's Office (rather than on the Regional Division of Ecological Services); in his view, this unit was the FWS representative in this conflict. Another PO suggested that the FWS should have been divided into specific subunits for this analysis, even within the Division of Ecological Services. A third suggested that the division be according to the interest each subunit sought to protect, for example, the protection of instream flows and fish habitat, the protection of wildlife habitat (especially that of the brown bear), or the prevention of an "unacceptable" precedent (i.e., building a major hydroelectric project on a National Wildlife Refuge). However, as one PO indicated, focusing on interests rather than a specific organizational unit might lead to an analysis of individual representatives of those interests, rather than organizations.

For comparison, Figures 7 through 10 contain both the NPO and PO boxplots for the five key organizations common to both LIAM analyses. That is, of the seven organizations analyzed by the NPOs, about which there was a substantial amount of information in the case study, and of the seven crucial players analyzed by the POs, five are common to both. Thus, the scores for these five organizations are used in comparing the two analyses. The overall pattern is remarkably similar between the two. There is less dispersion in the PO data than the NPO data. In both cases, however, the boxplots for FWS-ES span the length of the scale. There is a substantial agreement among NPOs, among POs, and between the two groups for the other four organizations on this variable. This pattern is repeated in Figure 8 for the Abritrator variable.

Figures 9 and 10 contain boxplots constructed from the NPO and PO data for the five common organizations on the Advocate and Guardian variables. The patterns are virtually identical. There is a minimal amount of dispersion of the NPO data for three organizations on both variables, although there is more scatter in the evaluation of FERC and DOR than the others. In the case of FERC, this is not surprising, since it is typically in the position of "objective decisionmaker" in hydroelectric project applications; thus no distinct preferences for outcome may have occurred or been perceived by the NPOs (based on the case study). This scatter is not reflected in the PO analysis, however. For all five organizations on both variables, the POs achieved great consistency in their evaluations.

#### Reliability--Phase I and II: Mann-Whitney and Spearman's Tests

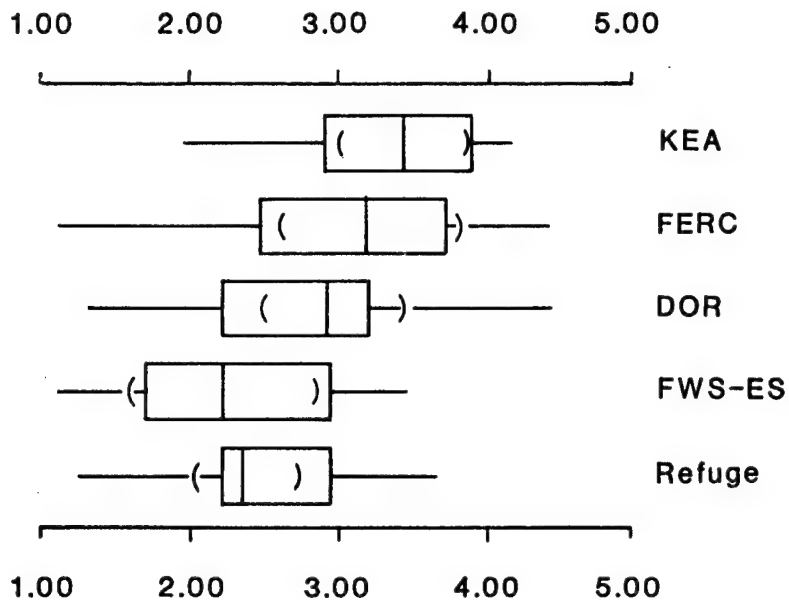
The second way in which the reliability of the LIAM instrument was tested was by comparing the NPO and PO analyses using the Mann-Whitney test statistic to accept or reject the null hypothesis that these two role data sets are identical. In all cases the null hypothesis could not be accepted at  $P \geq .95$  for any role variable. (The Mann-Whitney probability values are reported at the bottom of Figures 7-10:  $P = .551, .054, .526, \text{ and } .405$ .)

In the third reliability test for each of the five key organizations common to both LIAM analyses, Spearman's rank correlation between Phase I and

## PHASE I - NPOs:

Box Plot of Variable: **BROKER**, N = 49

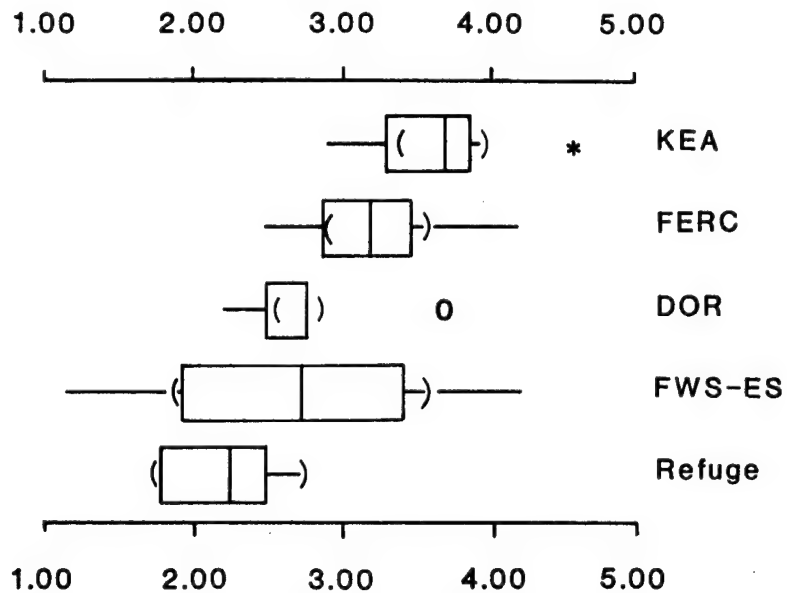
Grouped by Variable: **ORGANIZATION**



## PHASE II - POs:

Box Plot of Variable: **BROKER**, N = 32

Grouped by Variable: **ORGANIZATION**



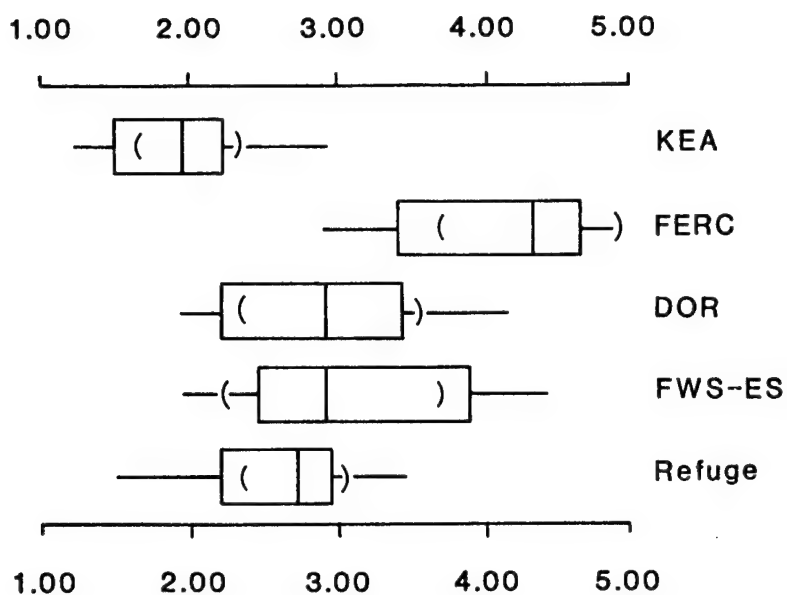
Mann-Whitney: P = .551

Figure 7. Phase I (NPO) and Phase II (PO) role boxplots, Broker variable (5 organizations common to both LIAM analyses).

## PHASE I - NPOs:

Box Plot of Variable: ARBITRATOR, N = 49

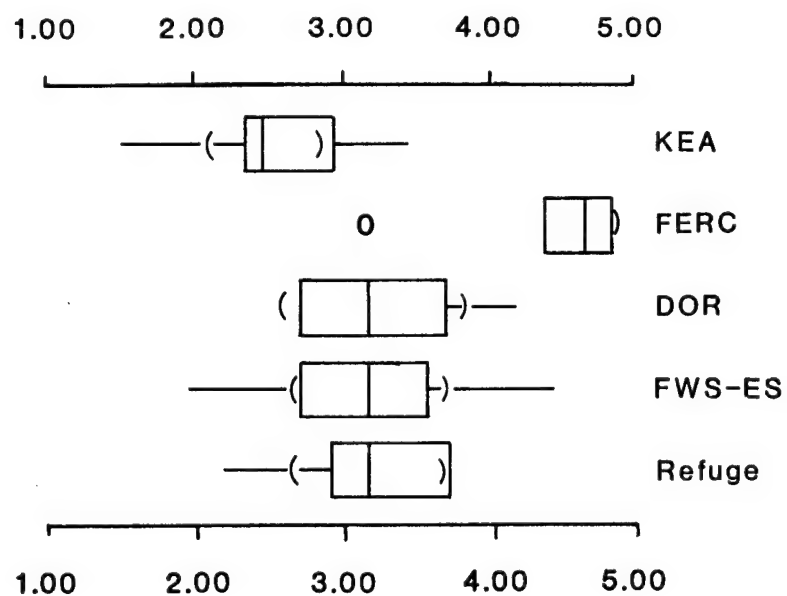
Grouped by Variable: ORGANIZATION



## PHASE II - POs:

Box Plot of Variable: ARBITRATOR, N = 32

Grouped by Variable: ORGANIZATION



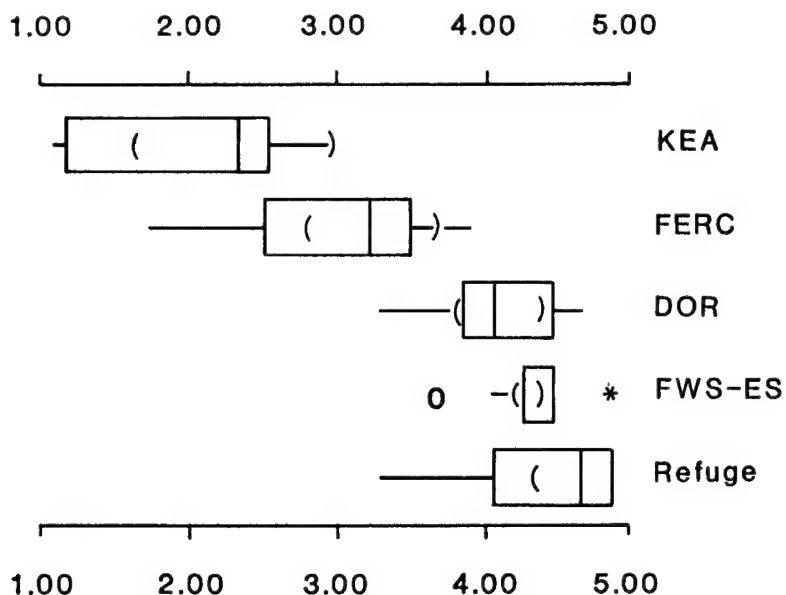
Mann-Whitney: P = .054

Figure 8. Phase I (NPO) and Phase II (PO) role boxplots, Arbitrator variable (5 organizations common to both LIAM analyses).

## PHASE I – NPOs:

Box Plot of Variable: ADVOCATE, N = 49

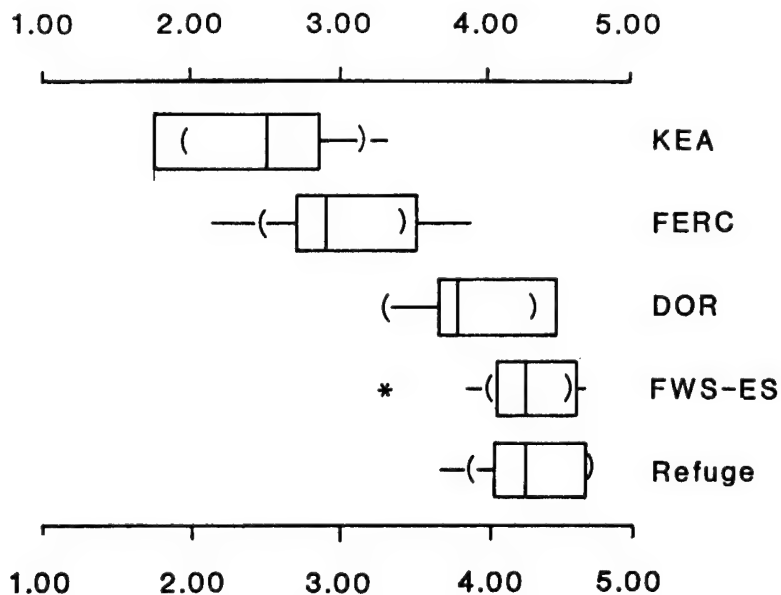
Grouped by Variable: ORGANIZATION



## PHASE II – POs:

Box Plot of Variable: ADVOCATE, N = 32

Grouped by Variable: ORGANIZATION



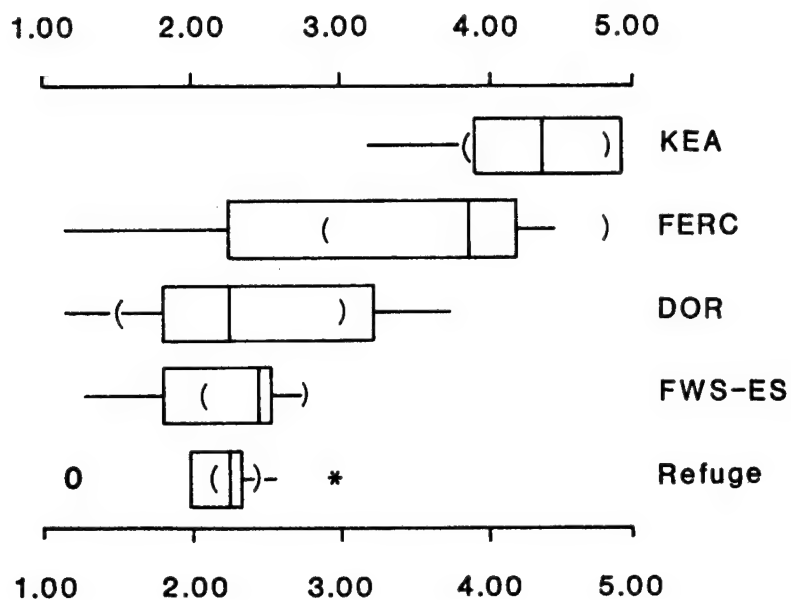
Mann-Whitney: P = .526

Figure 9. Phase I (NPO) and Phase II (PO) role boxplots, Advocate variable (5 organizations common to both LIAM analyses).

### PHASE I - NPOs:

Box Plot of Variable: GUARDIAN, N = 49

Grouped by Variable: ORGANIZATION



### PHASE II - POs:

Box Plot of Variable: GUARDIAN, N = 32

Grouped by Variable: ORGANIZATION

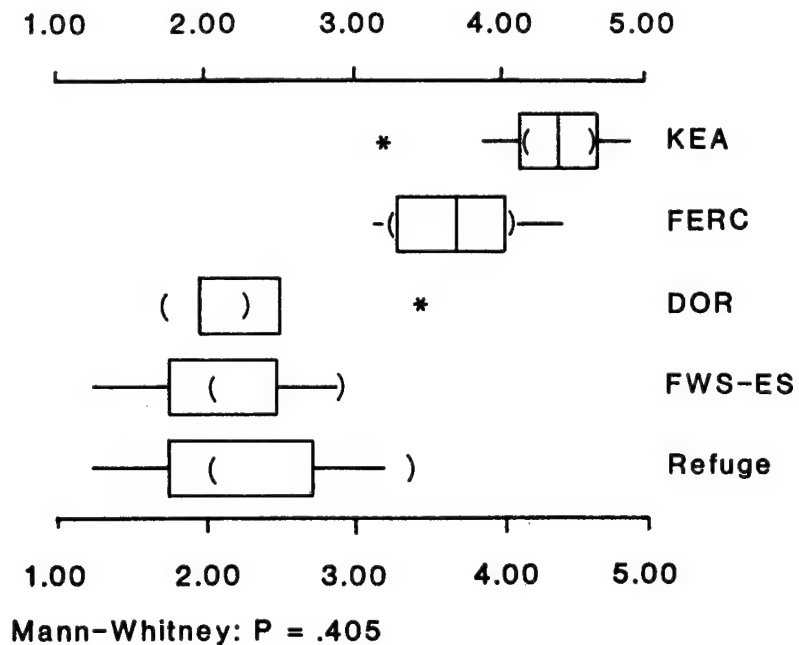


Figure 10. Phase I (NPO) and Phase II (PO) role boxplots, Guardian variable (5 organizations common to both LIAM analyses).

Phase II scores for each role variable were calculated. The interphase correlation for the Broker, Arbitrator, and Guardian roles equals .90, and for the Advocate role equals 1.0. In each case, the coefficient is larger than the .80 suggested by Kline and others to demonstrate reliability. Further, each coefficient is statistically significant. It appears that the two LIAM analyses are strongly and significantly correlated. Based on these results, the instrument may be considered reliable in terms of describing four roles.

#### Reliability--Phase I and II: Power Boxplots

NPO and PO boxplots were constructed for each power variable: Organizational Resources, Expertise, and Interest Group Support. Figures 11, 12, and 13 contain boxplots constructed from the NPO data for the three power variables for the seven major organizations. The widths of the boxplots in Figure 11--and thus the range of the scores for each organization on the Organizational Resources variable--are quite small. There are, however, eight outliers on this figure, represented as asterisks (tangential outliers) and circles (extreme outliers). Although there are few outliers for the Organizational Expertise variable (three as opposed to eight), there is also more dispersion of the data, as indicated by the longer lengths of the boxplots in Figure 12 than Figure 11. In Figure 13, the Interest Group variable yielded yet another pattern. In these boxplots, a great deal of agreement among the NPOs is apparent from the smaller lengths of the boxplots, and there are no outliers.

Figures 14, 15, and 16 contain boxplots constructed from the PO power data, for seven organizations. The overall pattern in each of these figures is similar to that observed in the equivalent NPO figures, although the PO boxplots for the three power variables are much smaller, indicating greater consistency among the POs in their analyses. In Figure 16, the boxplots for five organizations (KEA, ADNR, FWS-ES, ADFG, and Refuge) show almost no scatter at all in the data. Figures 17, 18, and 19 provide additional support for the accuracy of these evaluations. For the five organizations common to both LIAM analyses, the patterns of the NPO and PO boxplots are virtually identical, except there is less dispersion in the PO evaluations.

#### Reliability--Phase I and II: Mann-Whitney and Spearman's Tests

In only one case did the Mann-Whitney test permit the acceptance of the null hypothesis that the two power analyses are identical at  $P \geq .95$ : Organizational Resources ( $P = .98$ ). For the other two variables, the null hypothesis could not be accepted with confidence (Expertise,  $P = .399$ ; Support,  $P = .686$ ), and when the Phase I and II power scores for these five organizations were correlated using Spearman's rank correlation test, the resulting correlation coefficients were as follows: Resources,  $r_s = .80$ ; Expertise,  $r_s = -.10$ ; Support,  $r_s = .70$ . None reached the .90 required by the test to reach statistical significance. Thus it appears that reliability can be tentatively demonstrated for only one of the three power variables as measured by these two techniques: Organizational Resources.

There are three possible explanations for these findings. First, the instrument itself may be the source of the problem; perhaps the questions



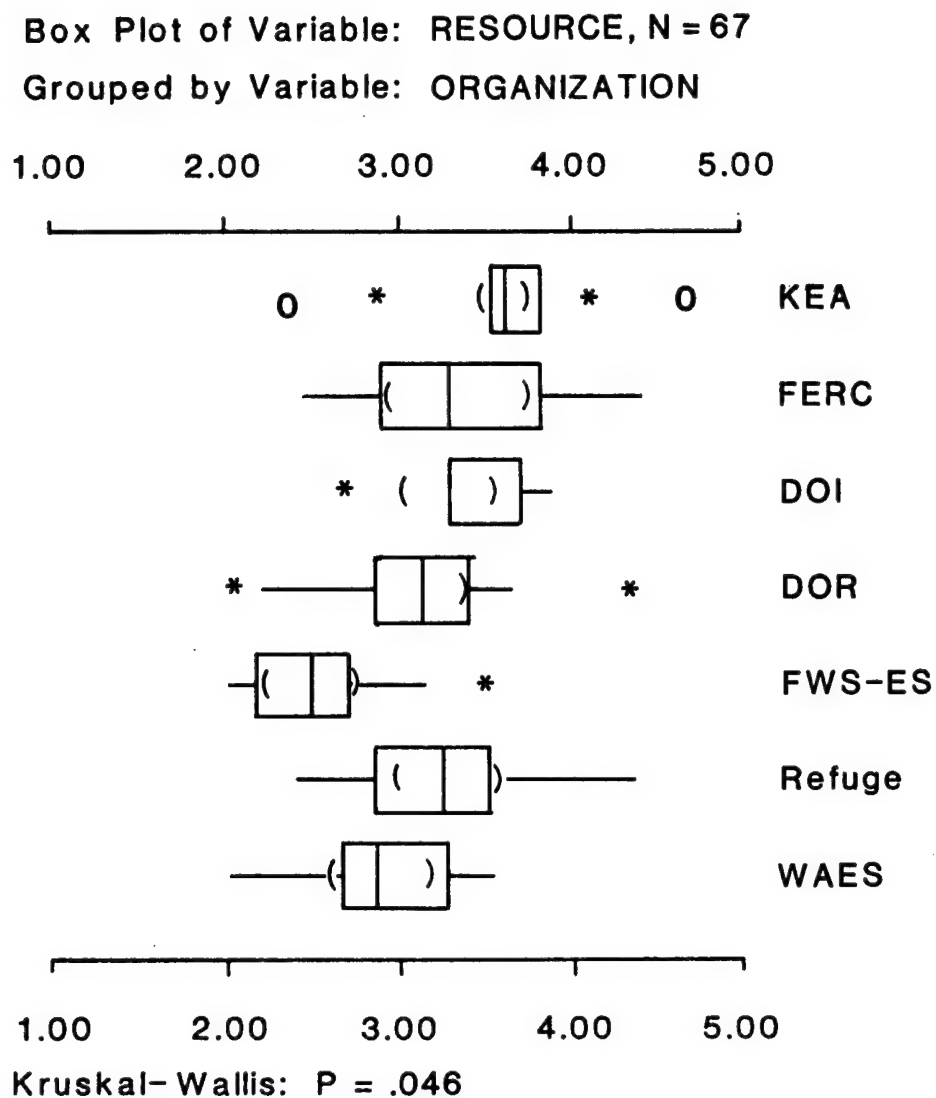


Figure 11. Phase I (NPO) power boxplots, Organizational Resources variable (7 organizations).

Box Plot of Variable: EXPERTISE, N = 67  
Grouped by Variable: ORGANIZATION

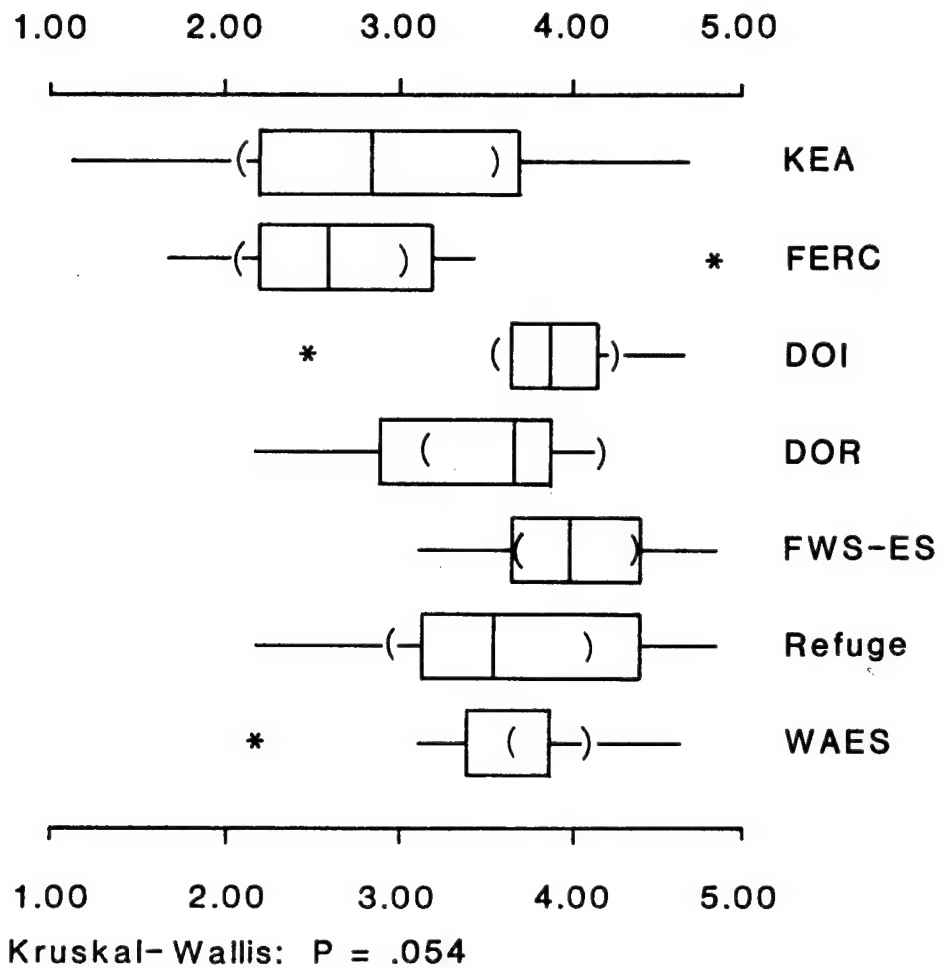


Figure 12. Phase I (NPO) power boxplots, Expertise variable (7 organizations).

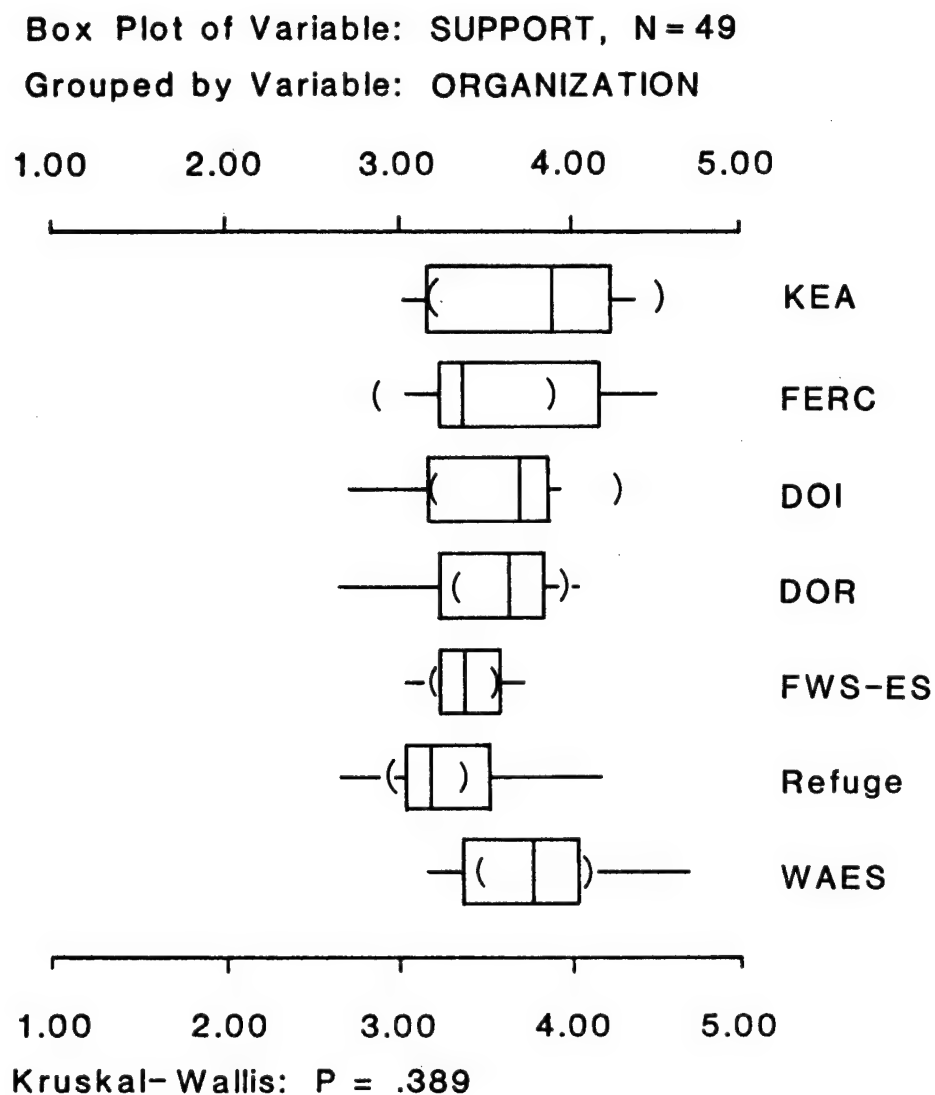


Figure 13. Phase I (NPO) power boxplots, Interest Group Support variable (7 organizations).

Box Plot of Variable: RESOURCE, N = 45  
Grouped by Variable: ORGANIZATION

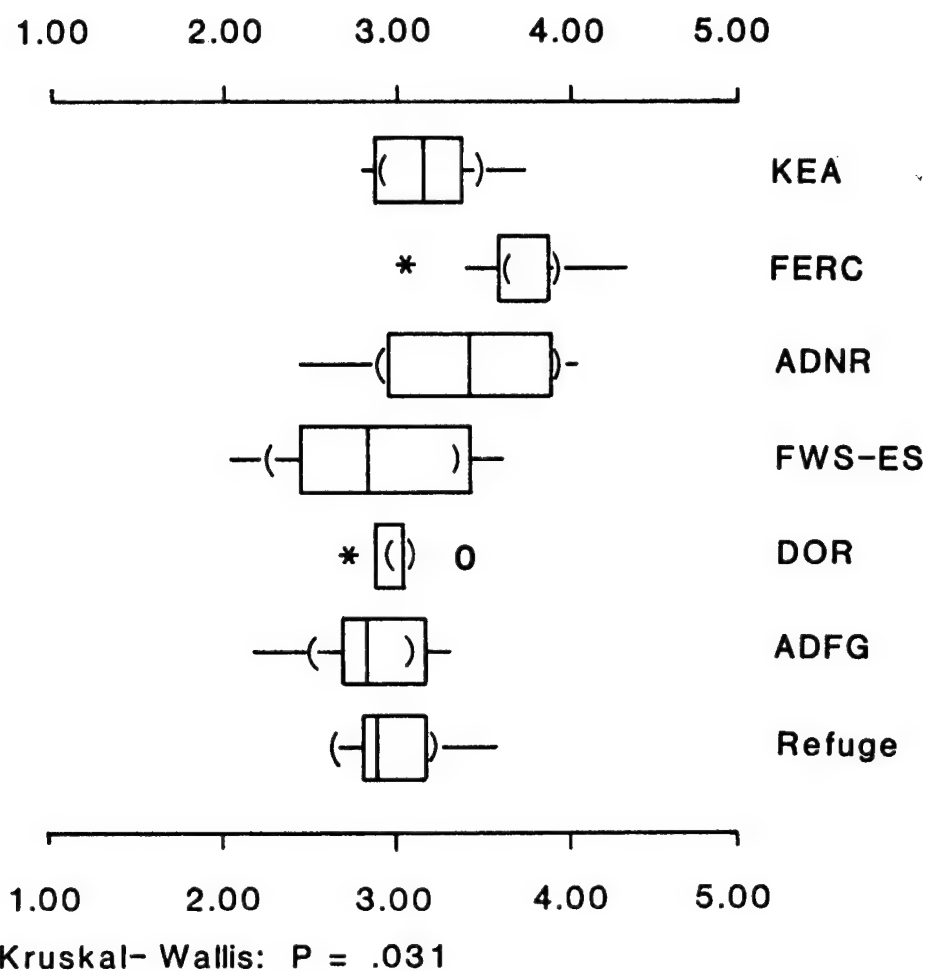


Figure 14. Phase II (PO) power boxplots, Organizational Resources variable (7 organizations).

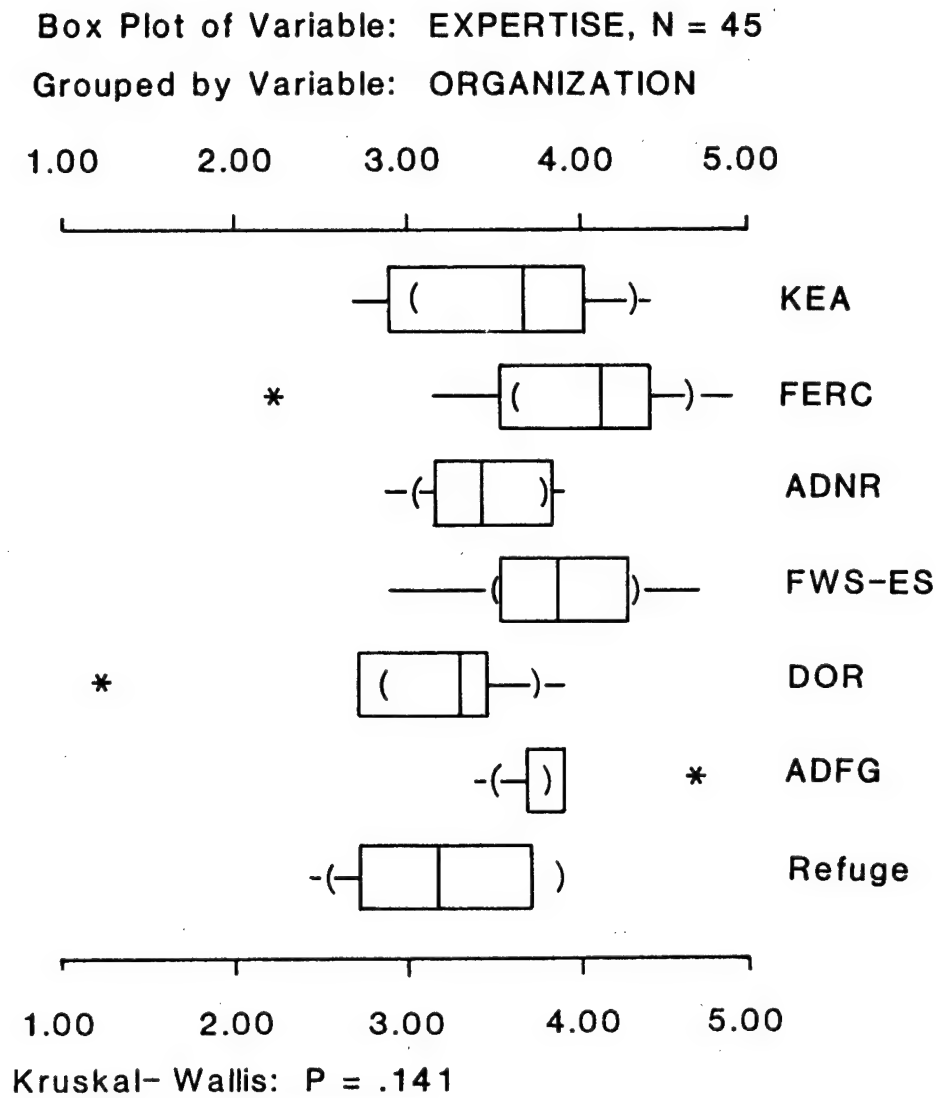


Figure 15. Phase II (P0) power boxplots, Expertise variable (7 organizations).

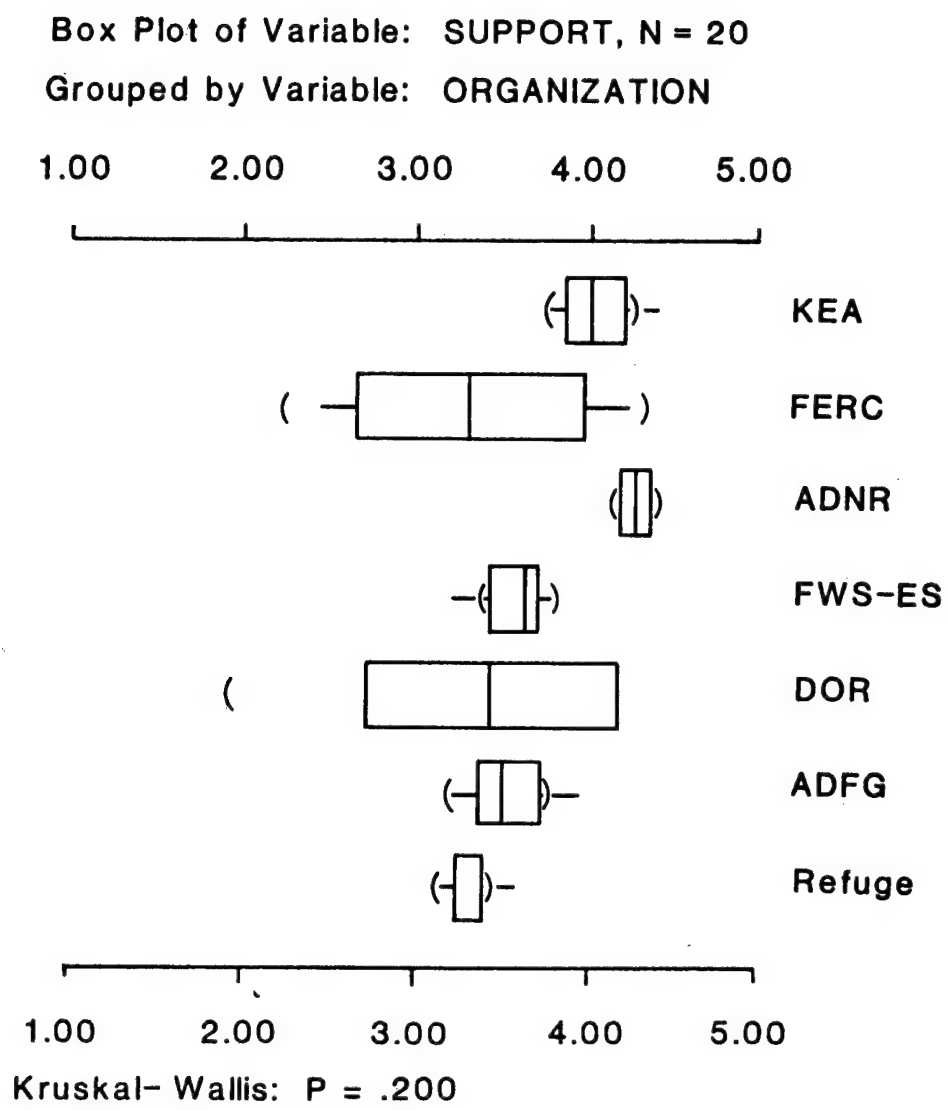
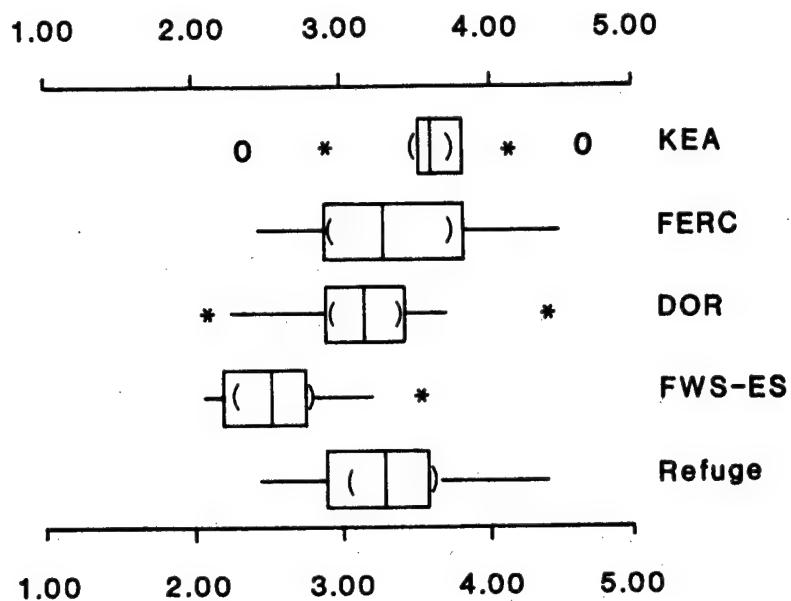


Figure 16. Phase II (PO) power boxplots, Interest Group Support variable (7 organizations).

### PHASE I - NPOs:

Box Plot of Variable: RESOURCE, N = 49

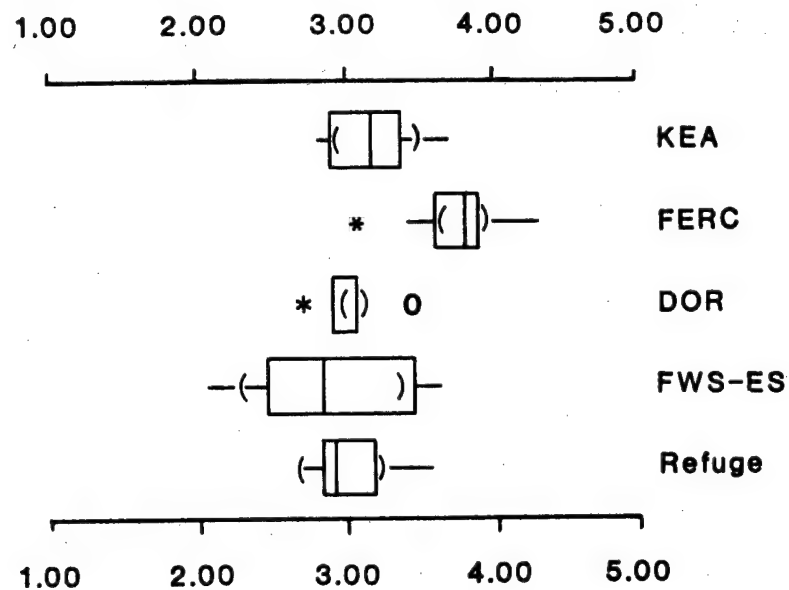
Grouped by Variable: ORGANIZATION



### PHASE II - POs:

Box Plot of Variable: RESOURCE, N = 32

Grouped by Variable: ORGANIZATION



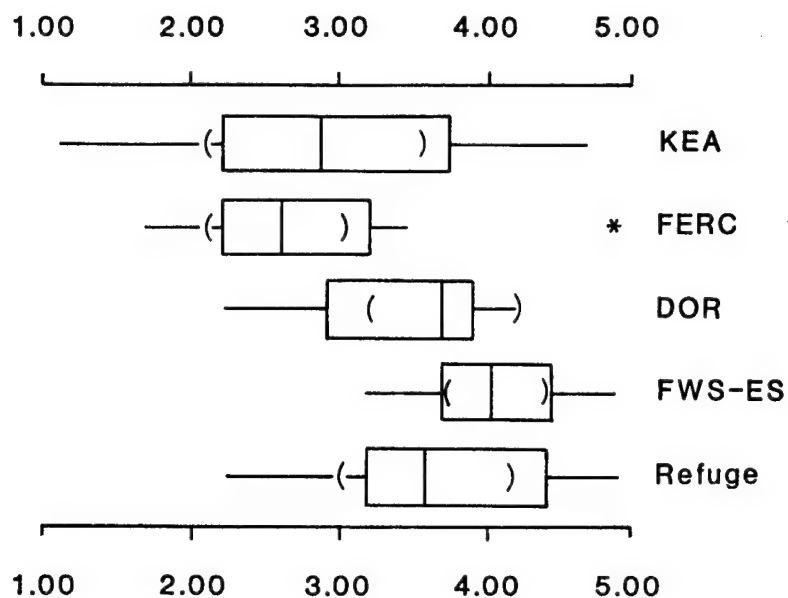
Mann-Whitney: P = .988

Figure 17. Phase I (NPO) and Phase II (PO) power boxplots, Organizational Resources variable (5 organizations common to both LIAM analyses).

## PHASE I - NPOs:

Box Plot of Variable: EXPERTISE, N = 49

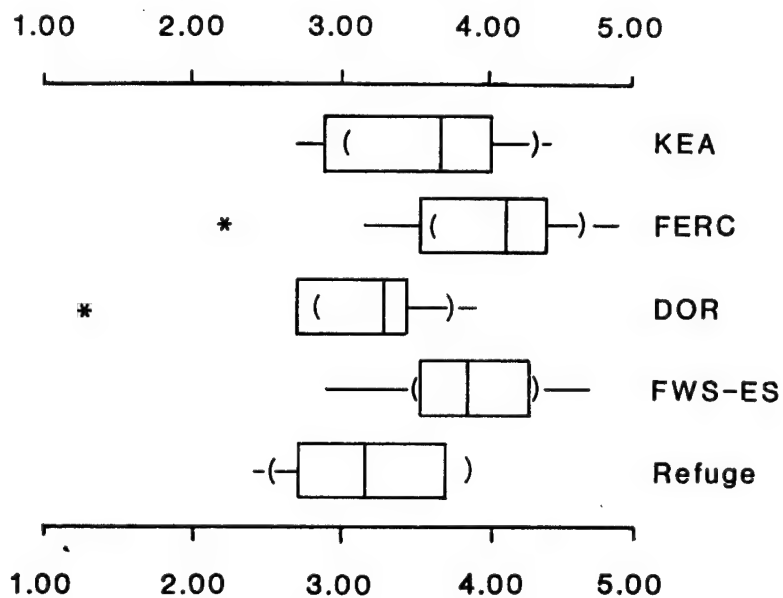
Grouped by Variable: ORGANIZATION



## PHASE II - POs:

Box Plot of Variable: EXPERTISE, N = 32

Grouped by Variable: ORGANIZATION



Mann-Whitney: P = .399

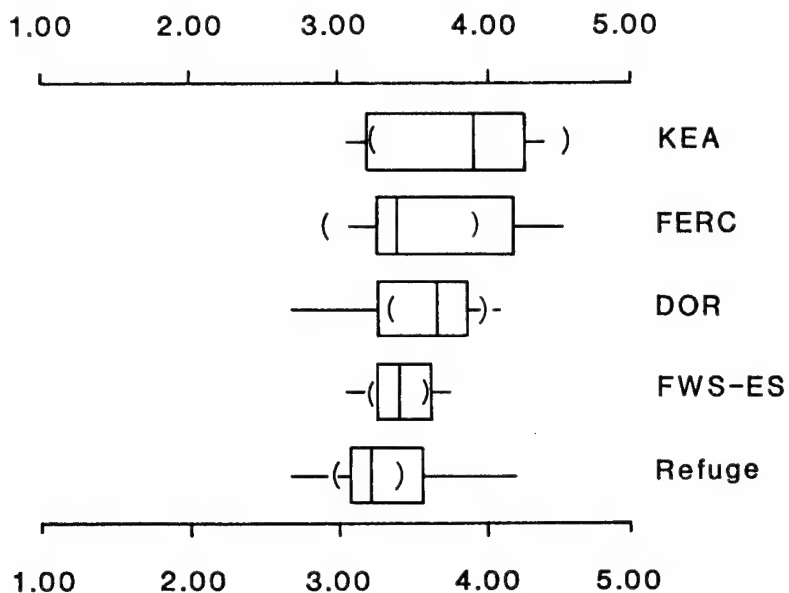
Figure 18. Phase I (NPO) and Phase II (PO) power boxplots, Expertise variable (5 organizations common to both LIAM analyses).



### PHASE I - NPOs:

Box Plot of Variable: SUPPORT, N = 36

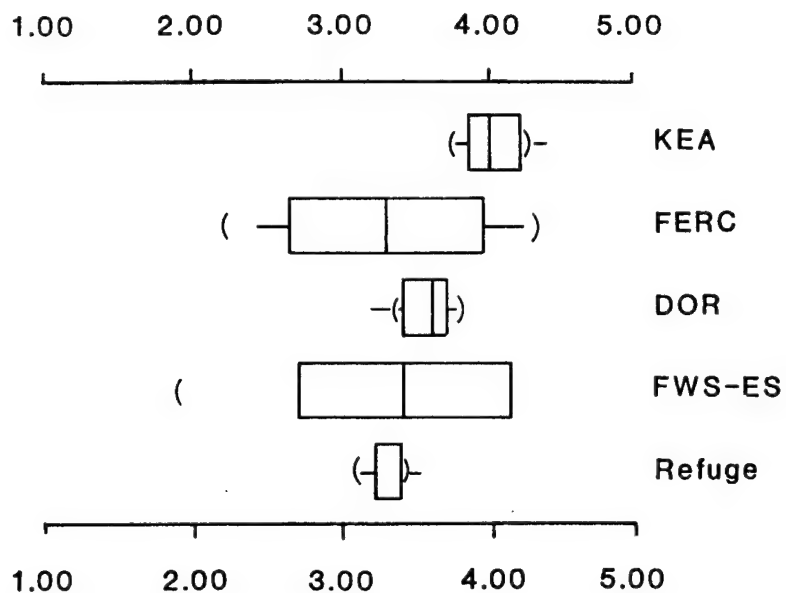
Grouped by Variable: ORGANIZATION



### PHASE II - POs:

Box Plot of Variable: SUPPORT, N = 15

Grouped by Variable: ORGANIZATION



Mann-Whitney: P = .686

Figure 19. Phase I (NPO) and Phase II (PO) power boxplots, Interest Group Support variable (5 organizations common to both LIAM analyses).

designed to reliably measure Organizational Expertise and Interest Group Support do not do so. Second, perhaps the case study did not adequately describe the organizations in terms of these two variables. Since the design of the content analysis did not include an examination of power, no definitive conclusion can be made at this point. Third, perhaps variations in organizational power can only be discerned by those directly involved. This would explain the greater degree of consistency among the POs in their power evaluations of these organizations, and the failure of the two data sets to be significantly correlated.

## VALIDITY: THE QUESTIONNAIRE AND THE MODEL

### Content Validity

The content validity of the LIAM questionnaire was documented in several ways. In the case of face validity, the questionnaire went through several iterations prior to its inclusion in this study. The questions were pretested and refined (see Appendices I and IV). And a semifinal draft of the questionnaire was submitted to two experts in the field of questionnaire development, who made suggestions for its improvement. In addition, the LIAM approach was subjected to a preliminary review by a panel of experts (see Appendix IX).

In the case of sampling validity, the theoretical underpinnings of this approach were documented. The characteristics associated with each role type were identified in the literature, and questions developed and refined to measure each of those characteristics. In the professional judgment of this investigator, none of the characteristics were omitted.

### Empirical Validity

The LIAM role map constructed from the mean PO scores for the seven key organizations in the Terror Lake conflict appears in Figure 20. Based on these results, the expected behavioral patterns for each of these organizations is as follows:

#### KEA--Subquadrant B-4 (Moderate Guardian-Broker)

Will cooperate in efforts to prevent changes in the traditional use and management of resources, but prefers to join a political coalition to resist change and protect its own economic and constituency interests. Will use economic and constituency information to support its position. Will not resist efforts to keep or push the conflict into the distributive arena, where the outcome is a negotiated or brokered one. Will avoid taking positional stands in bargaining situations and will be somewhat open to compromise.

#### FERC, ADFG, DOR--Subquadrant D-8 (Moderate Advocate-Arbitrator)

Will cooperate in efforts to protect environmental and non-traditional values, and will contribute to campaigns to protect such

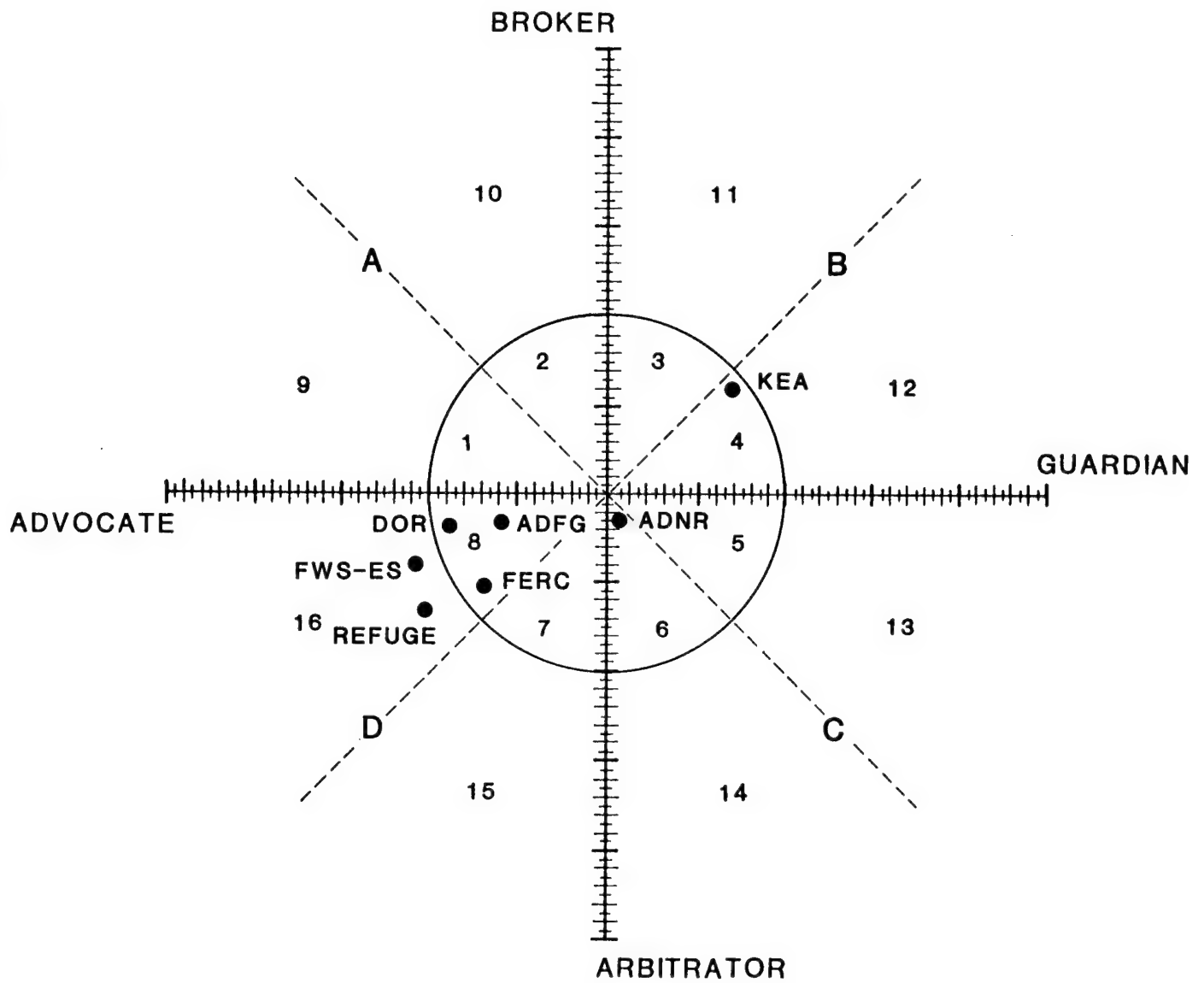


Figure 20. LIAM role map (mean scores, Phase II analysis).

values, and to initiate changes in the ways in which resources have been used and managed in the past. Will not resist efforts to keep or push the conflict into the regulatory arena, where decisions are made by an arbitrating organization authorized to make the decision based on evidence presented by all sides to a dispute. Prefers and will use scientific and technical data to document its position. Will take positional stands in bargaining situations, and will not be very open to compromise.

ADNR--Subquadrant C-6 (Moderate Arbitrator-Guardian)

Will cooperate in efforts to keep or push the conflict into the regulatory arena, where decisions are objectively made by an arbitrating organization based on evidence presented by all sides to a dispute. Prefers and will use economic information (such as cost-benefit analysis) to support its position. Will not resist efforts to prevent change in the traditional use and management of resources, and will not resist campaigns initiated by others on behalf of economic and constituency values. Will take positional stands in bargaining situations, and will not be very open to compromise.

FWS-ES Refuge--Subquadrant D-16 (Extreme Advocate-Arbitrator)

Will frequently speak out--in the media, at public meetings and the like--on behalf of environmental values and will lead efforts to change the traditional ways in which resources have been used and managed in the past. Will employ crusading techniques to protect the environment from the crises it feels are approaching, and generate and use scientific and technical data to support its position. Strongly believes in the correctness of its environmentally protective world view, and will join efforts to keep or push the conflict into the regulatory arena, where the decision is made by an arbitrating organization based on evidence presented by all sides to the dispute. Will take absolute positions in bargaining situations and not be open to compromise.

These descriptions were obtained from the PO LIAM analyses of these organizations; in locating each organization on the role map, and selecting the expected behavioral description for each, the average scores for each role index were used, as is currently recommended by Wilds (1986). For the purpose of comparing expected with observed behaviors, these same POs were sent a general description of the LIAM, a role map, and a list of the expected behavioral patterns. They were asked to select, for each organization, the behavioral description that best described that organization's behavior during the Terror Lake conflict (see Appendix VII). The results of this exercise are presented in Figures 21-27. In each of these figures, the asterisk represents the location of that organization using the mean PO scores from the LIAM questionnaire analysis, while the dots represent the location of that organization by each of the six POs who completed the matching exercise.

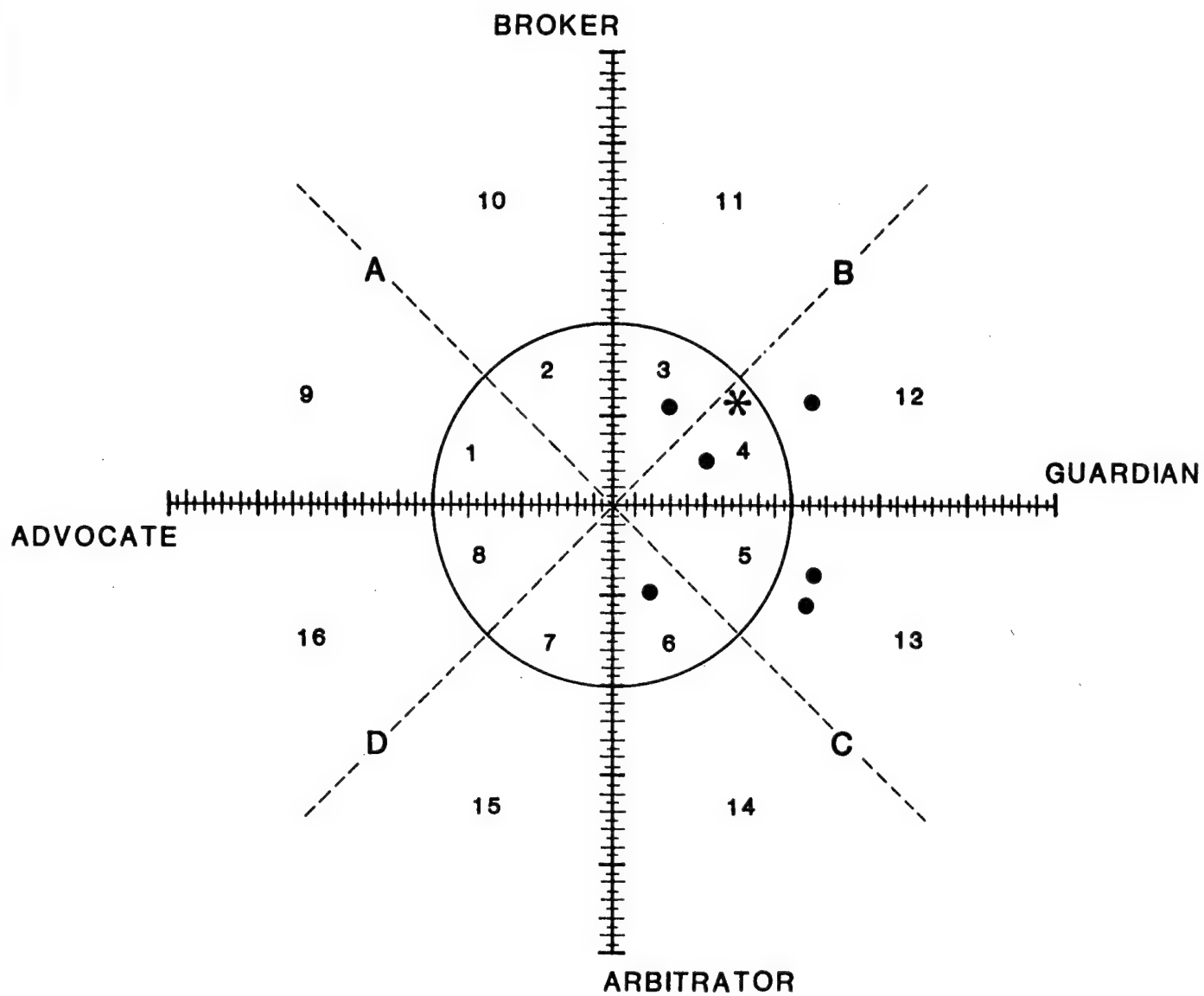


Figure 21. Phase III (PO) matching exercise: expected (\*) and observed (●) behavioral patterns (KEA).

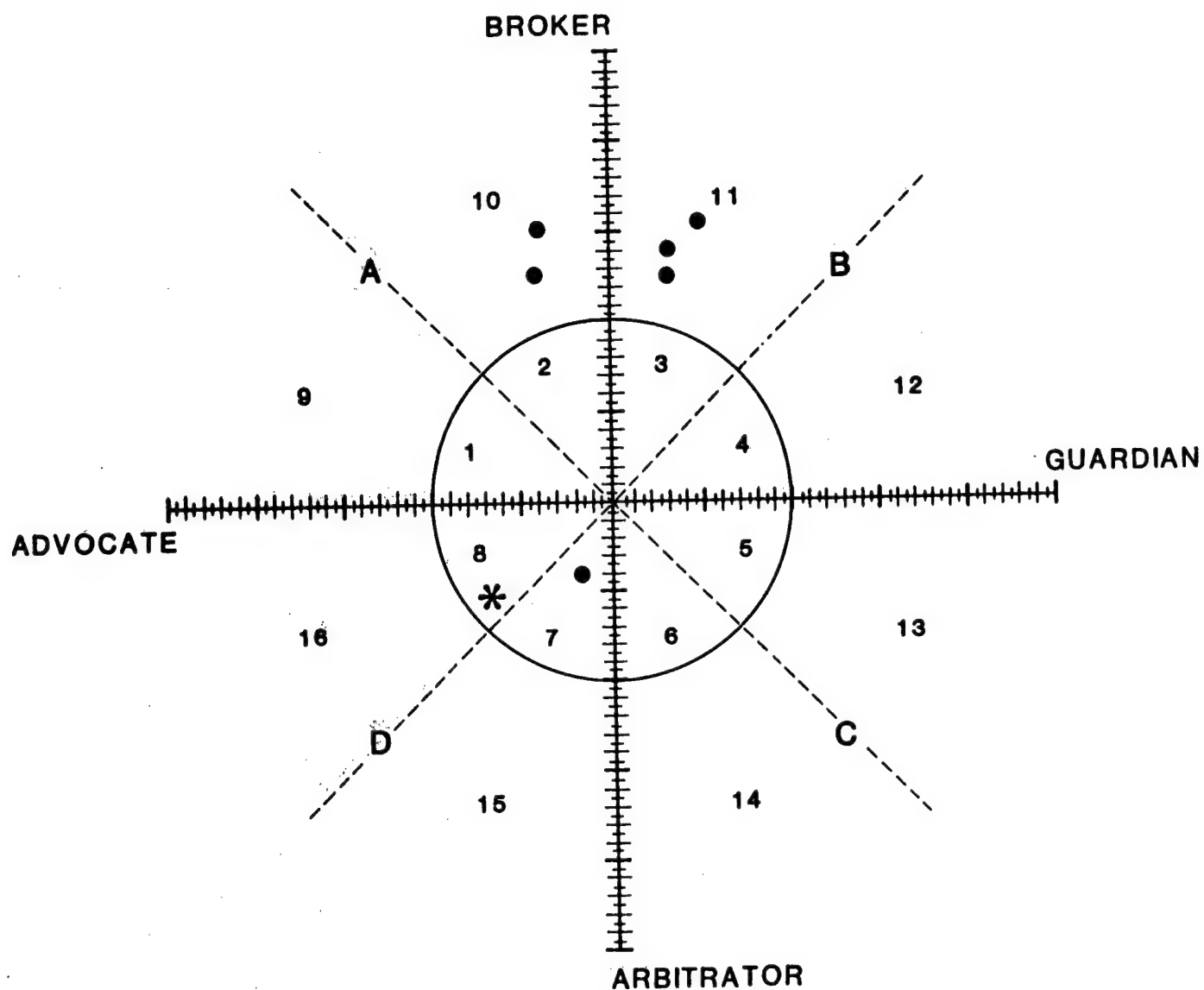


Figure 22. Phase III (PO) matching exercise: expected (\*) and observed (●) behavioral patterns (FERC).

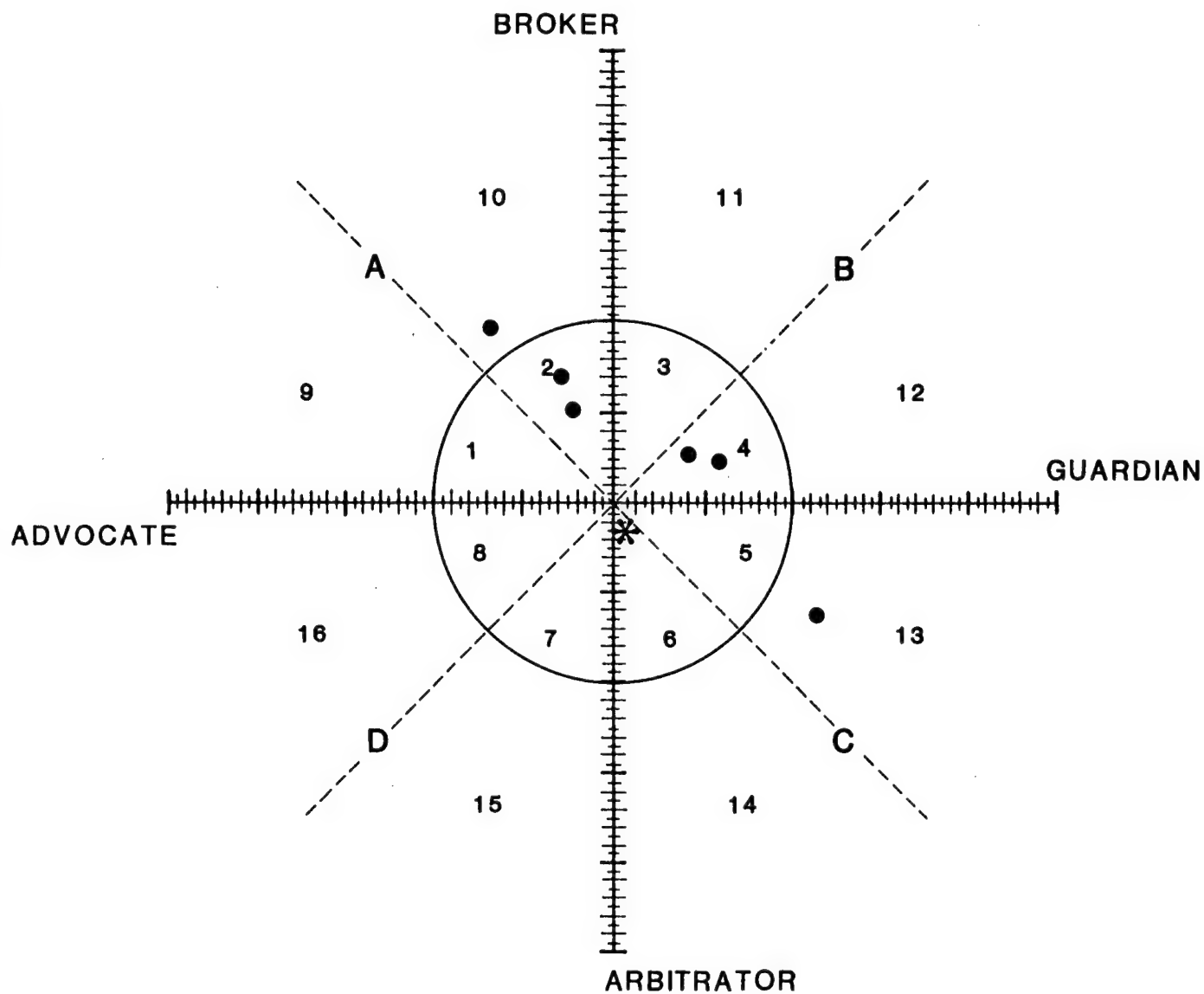


Figure 23. Phase III (PO) matching exercise: expected (\*) and observed (●) behavioral patterns (ADNR).

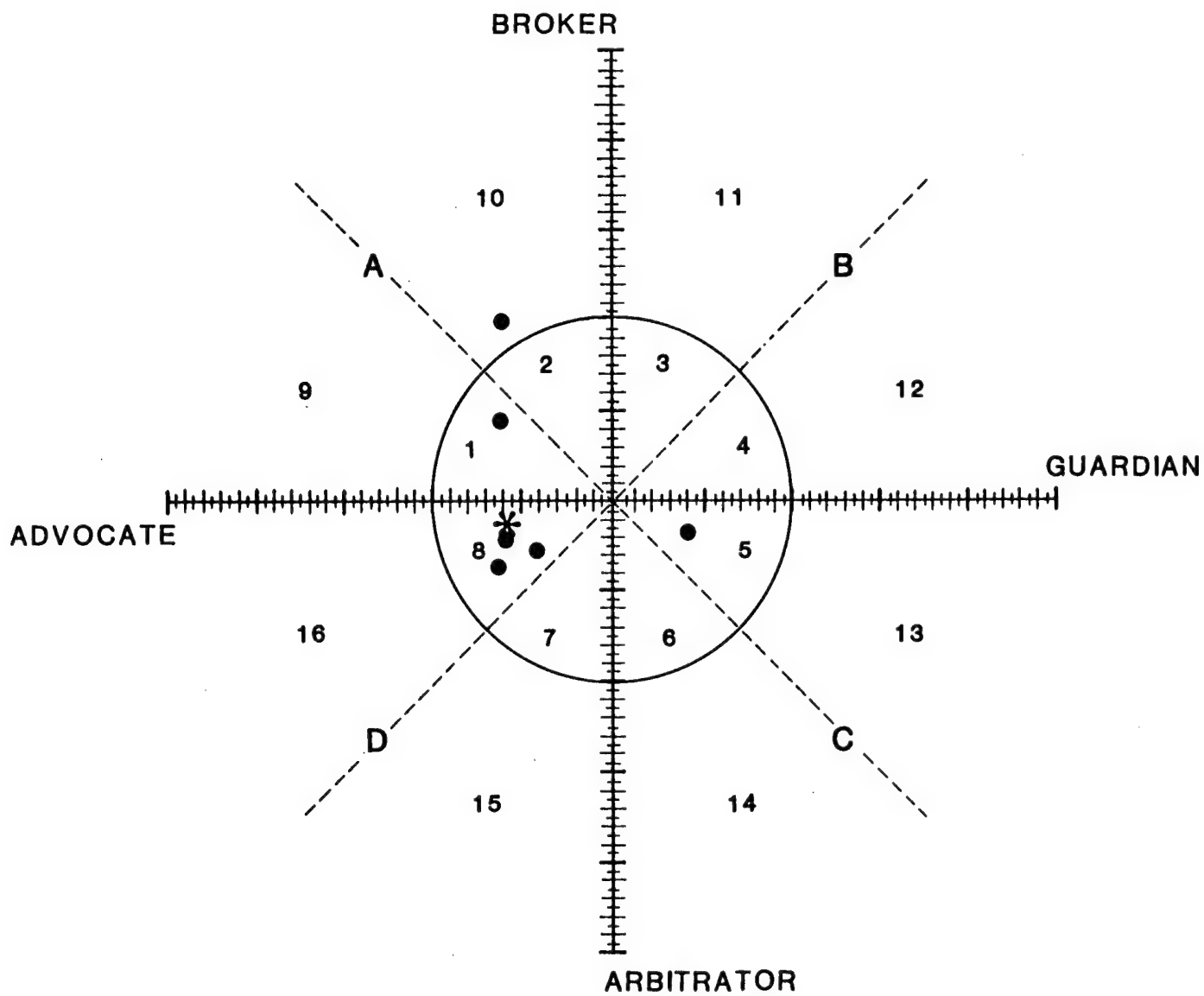


Figure 24. Phase III (PO) matching exercise: expected (\*) and observed (●) behavioral patterns (ADFG).



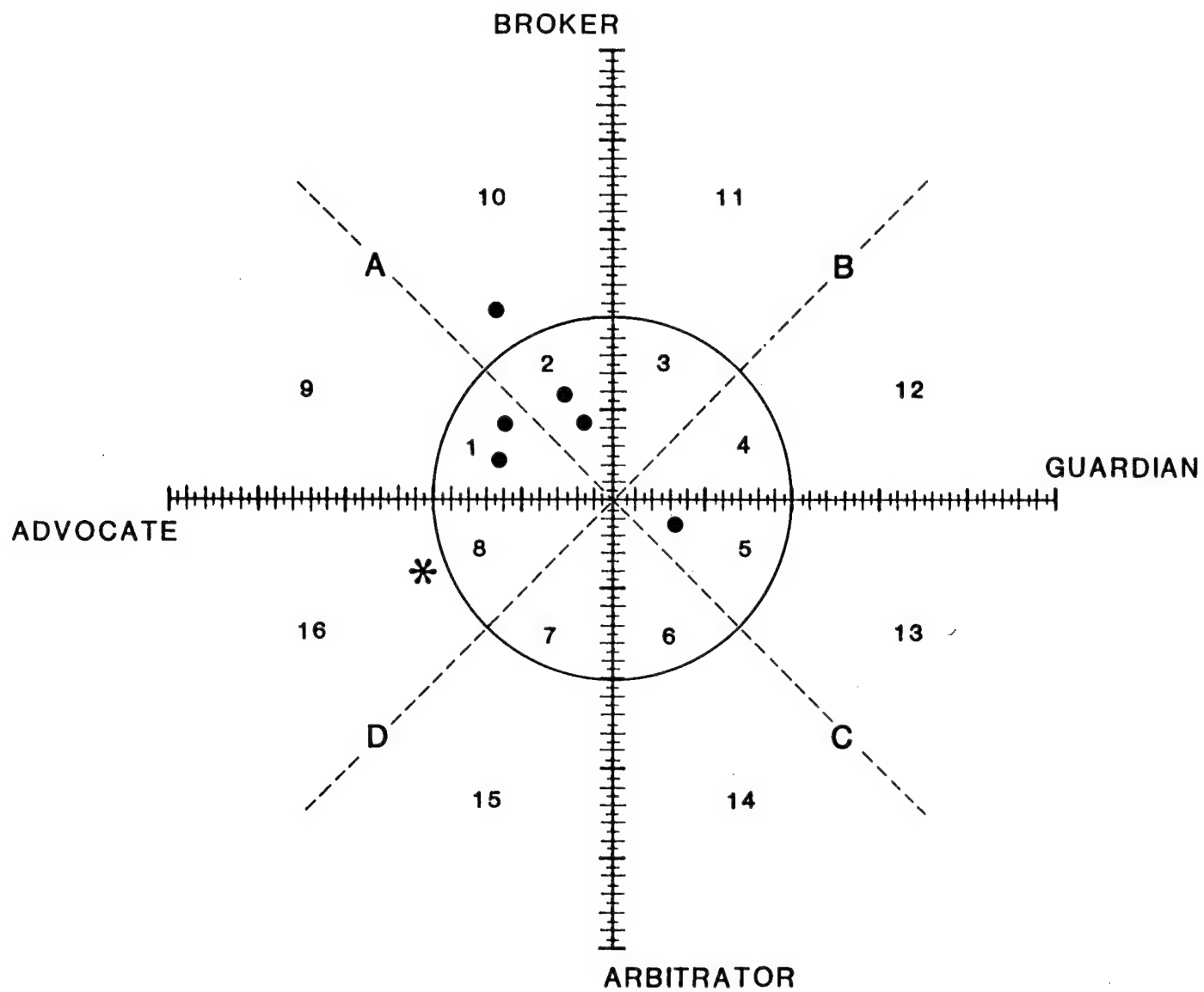


Figure 25. Phase III (PO) matching exercise: expected (\*) and observed (●) behavioral patterns (FWS-ES).

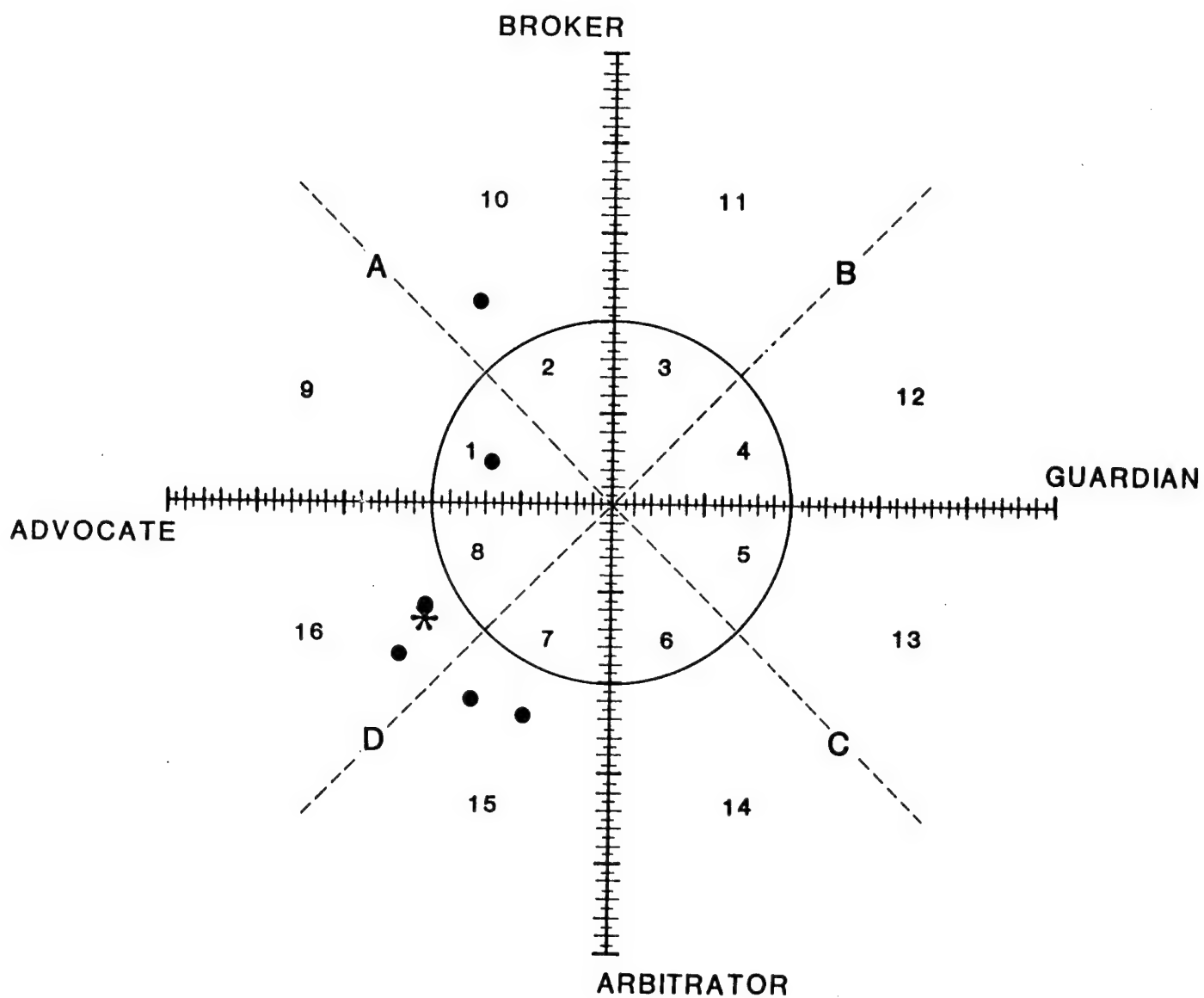


Figure 26. Phase III (PO) matching exercise: expected (\*) and observed (●) behavioral patterns (Refuge).

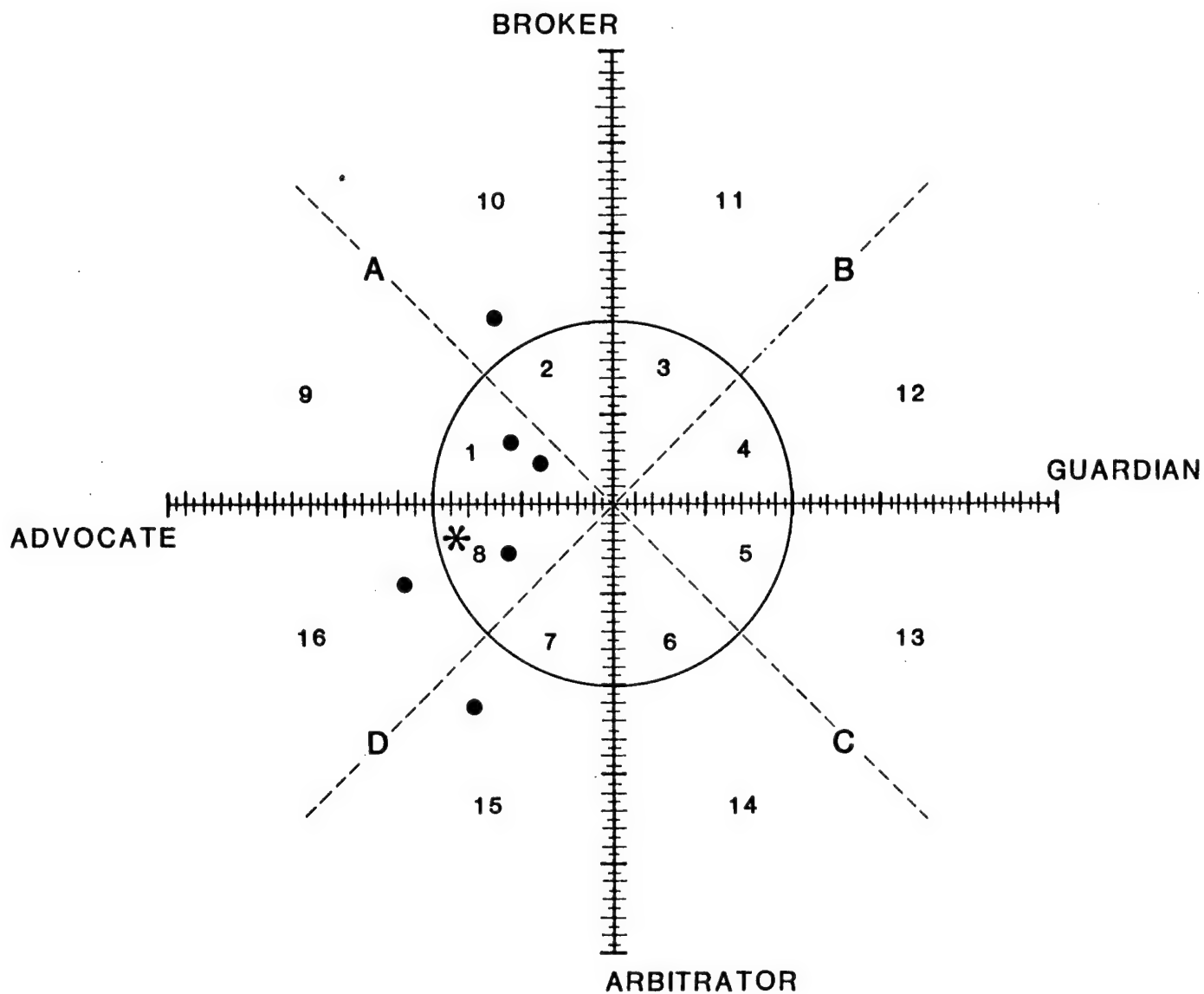


Figure 27. Phase III (PO) matching exercise: expected (\*) and observed (●) behavioral patterns (DOR).

There was some disagreement among the POs in their evaluation of these seven organizations. The degree, direction, and nature of disagreement varies from organization to organization, however. In Figure 21, the POs all agreed that the KEA emitted behaviors associated with the Guardian role type, but were divided in their assessment of the KEA in the second behavioral dimension: three POs claimed the KEA emitted Broker-like behaviors, and three, those of an Arbitrator. According to the asterisk located in subquadrant B-4, the average PO scores for KEA led to the prediction that the KEA would behave like a moderate Guardian-Broker in this conflict. Only one of the six respondents placed KEA in the same subquadrant as was the case in the PO LIAM analysis (Figure 20).

In Figure 22, five of the six respondents selected the behavioral description associated with an extreme Broker for FERC, while three associated it with Guardian behavior, and three, Advocate. In the Phase II analysis, however, moderate Advocate-Arbitrator behaviors were predicted for this organization. None of these respondents placed FERC in the same cell as the asterisk is located (Figure 22).

The POs also were divided in their evaluation of the behavior of ADNR (Figure 23). Half associated it with Guardian-like behavior, and half, that of an Advocate. Five of the six agreed that ADNR emitted behaviors associated with a preference to operate in the distributive arena. The Phase II analysis predicted just the opposite set of behaviors for ADNR. None of POs selected the predicted behavioral description. In the case of ADFG (Figure 24), two selected Broker-like behaviors; the other four selected Arbitrator-like behaviors. Five of the six respondents agreed, though, that ADFG emitted behaviors associated with a preference for a pro-environmental outcome. Three of these assignments were in the subquadrant represented by the asterisk in Figure 24.

Five of the six respondents agreed that FWS-ES (Figure 25) behaved like an Advocate-Broker in this conflict (the sixth respondent placed FERC in subquadrant C-5, Moderate Guardian-Arbitrator). The questionnaire analysis, however, predicted that the FWS-ES would emit behaviors associated with a preference to operate in the regulatory arena. None of the respondents placed this organization in the exact subquadrant indicated in the Phase II analysis.

For the Refuge (Figure 26), all respondents selected Advocate-like behaviors, as predicted by the questionnaire results, and two thought Refuge behaved more like a Broker than an Arbitrator. The same type of results were achieved for DOR (Figure 27). All agreed, as predicted, that this organization behaved like an Advocate. Yet they were divided in their evaluation of DOR in the second behavioral dimension; three selected Broker-type behaviors, and three, that of an Arbitrator. Only one of the respondents selected the exact behavioral pattern predicted using the LIAM questionnaire results.

It appears that there was a fairly accurate match between predicted and observed behaviors for five of the seven organizations in the Advocate-Guardian dimension. The two exceptions are FERC and ADNR. For both organizations, the respondents were divided, three saw each organization as behaving like an Advocate, and three, as a Guardian. Five of the six respondents in each case

agreed that both organizations were Broker-oriented in this conflict. This was not predicted by these respondents in the Phase II questionnaire analysis. The conflicting behavioral perceptions regarding outcome for ADNR may have resulted from the ambiguous role of the ADNR in this conflict. In the case of FERC, the fact that the commission typically plays the role of objective decisionmaker while the environmental staff sometimes mediates may have influenced perceptions about the FERC's preference for outcome. For the other five organizations, the direction of expected and observed behaviors in pursuit of outcome were the same, although the specific subquadrant behavioral descriptions did not match in each case.

In the Broker-Arbitrator dimension, the results are also mixed. Five of the six respondents in each case agreed that FERC, ADNR, and FWS-ES were Broker-oriented in this conflict. Yet the opposite behavioral pattern was predicted for each in the questionnaire analysis. It is true, however, that in the case of the ADNR, the mean scores placed it very close to the Broker-Arbitrator line, predicting a very moderate preference to operate in the regulatory arena. The six respondents were divided in their selection of observed behaviors for the KEA. While three agreed, as predicted, that the KEA exhibited Broker-like behavior, three also selected the behavioral pattern associated with an Arbitrator. And four of the six respondents agreed that, as predicted, the ADFG emitted behaviors associated with a preference to operate in the regulatory arena, a pattern that was reported for Refuge. For DOR, the respondents were equally divided.

These results may be due to a number of factors. First, these organizations may have shifted from one behavioral pattern to the other as the conflict progressed. This would certainly explain the scatter among the POs in their assessments of these organizations as Brokers or Arbitrators: the POs may have actually observed both types of behaviors at different points in time. Several respondents indicated, for example, that the various resource organizations (FWS-ES, ADFG, DOR, and Refuge) initially took a strong and negative stand against the project. They were in what they felt was a legally secure position, in view of the fact that this project was to be constructed on a National Wildlife Refuge--an unthinkable proposition from the perspective of the Refuge. These organizations were quite willing to take the KEA to court to stop the project.

According to one closely involved respondent, as the conflict progressed, a new Federal Administration came into office, one that was highly development oriented. The Administration, through its Department of the Interior representative in Alaska, made it clear that the Terror Lake project should be negotiated, and that the negotiations should be concluded with the project being built. They also made it clear that they did not care how much of a price was exacted from KEA (in terms of mitigation), so long as the price did not "appear to be grossly excessive to the public" (Anonymous, May 18, 1987). In addition, this respondent stated that the interested and involved Alaskan environmental groups were fairly weak compared to the development-oriented interests. The development community wanted the project built, and were quite vocal in their demands. This being the case, the resource organizations had to settle for what they could obtain in a mandated negotiation process. As the negotiations moved along, and it became obvious that the KEA was willing

to cooperate and compromise, perhaps the resource organizations began to realize that a negotiated solution could serve their ends as well as an arbitrated one, in the long run. The FERC environmental staff may have contributed to this development by encouraging the parties in the negotiation process.

Second, the test itself may have been flawed because: (1) no third-party (objective) observers were built into the design of this element of the study, since it was retrospective and dealt with a conflict that had already been concluded; (2) no two-tiered design was incorporated into the study, in which one could compare archetypical or ideal role types (quadrant locations), as well as intensity and direction of predicted and observed role types (sub-quadrant locations); (3) no averaging method was built into the matching exercise for the individual responses; and (4) the way in which the expected behavioral descriptions associated with each role map subquadrant were developed was not subjected to rigorous testing and outside review.

It appears that the empirical validity of the LIAM needs to be retested in another setting. The research design employed in a second study, however, should be altered to overcome the problems identified here. If similar results are obtained, the LIAM behavioral descriptions associated with the 16 role types might need to be reformulated, so that there is a more direct and apparent connection between role characteristics and predicted behaviors. The LIAM behavioral predictions may need to be reformulated so that the distributions between different types of behaviors are more evident to observers.

#### Construct Validity: Group Differentiation

One of the tests of construct validity involves the ability of an instrument to permit users to "differentiate among groups." It should allow users to appropriately discriminate among different organizational types, and to categorize like-organizations together. If a diverse set of organizations is the focus of an analysis, such as in the Terror Lake conflict, the results should reflect that diversity. The Kruskal-Wallis test was performed to reject or accept the null hypothesis that the responses within each set of organizational analyses (Phase I and Phase II) are identical. Since at least two organizations (FERC and KEA) are typically very different from the others, the tests should result in the rejection of the null hypothesis. Kruskal-Wallis probability values are reported at the bottom of Figure 3-6.

The Kruskal-Wallis test was also performed on the power variables, to test the null hypothesis that in each phase, the organizations are identical. The Kruskal-Wallis probability values are reported at the bottom of power Figures 11-16.

For each role variable, the resulting probability value is less than .05. Thus, the scores apparently do differ from organization to organization--and the likelihood that this finding is due to random error approaches zero for each case. This suggests that the LIAM, and the questionnaire developed from the LIAM framework, allows individuals to discriminate among organizational role types.

In addition, the underlying patterns between the two analyses, as evidenced by the boxplots, were examined to determine whether or not the evaluations of these organizations were in theoretically sound and intuitively sensible directions.

Several observations can be made from Figures 3 and 4. The first organization (KEA) was evaluated as strongly preferring a brokered decision in this conflict, as was the DOI. The overall tendency of the rest of the organizations on this diagram, however, is towards the middle, suggesting that these organizations were willing to operate in either arena. This is not the case for outcome.

In Figure 4, KEA strongly preferred a developmental outcome, and the latter five fell in the opposite direction on these scales. The FERC fell in the middle of both scales. This is not surprising, however, since the Commission is typically in the position of "objective decisionmaker" in hydro-electric project applications; thus no distinct preferences for outcome may have occurred or been perceived by these respondents. In both sets of boxplots in Figure 4, the preferences of the other six organizations are clearly delineated--and each half of the figure is more or less a mirror image of the other half. Since KEA was the licensing applicant, this seems to be an accurate assessment of this organization. The missions of the latter four organizations (DOR, FWS-ES, REFUGE, and WAES) were directly tied to environmental protection, so it is not surprising that these organizations were evaluated strongly in the Advocate. A possible explanation for the fact that the Advocate organizations fell in the middle of both the Broker and Arbitrator scales may be found in the case study itself. Perhaps organizational preferences for one decision arena over the other are not as obvious as preferences for outcome.

The null hypothesis that the Phase I organizations were the same was rejected at  $P \leq .05$  for one power variable in the Phase I analysis: Organizational Resources ( $P = .046$ ). For the other two power variables, the null hypothesis could not be rejected at  $P = .05$  (Expertise,  $P = .054$ ; Support,  $P = .389$ ). This pattern was repeated in the PO power analyses (Organizational Resources,  $P = .031$ ; Expertise,  $P = .141$ ; Support,  $P = .200$ ). At least three possibilities may help explain this result. First, this result may be due to the fact that variations in power among this set of organizations were difficult to determine from the case study. Second, the questions designed to measure Organizational Expertise and Interest Group support may need to be refined; the questions, as currently worded, simply may not allow users to discriminate among these two indicators of power. Or third, these organizations actually may have been similar in terms of the amount of Organizational Expertise and Interest Group Support each possessed.

The third explanation is more plausible than the first. The results of the PO power analyses are similar to those of the NPOs, as evidenced by the two sets of boxplots. And in the case of Organizational Resources, the Mann-Whitney test permitted the acceptance of the null hypothesis that the two

analyses were identical ( $P = .988$ ). According to at least one expert in questionnaire development and testing (Kleinmuntz 1967), when two applications of the same instrument produce largely similar results, one can reasonably assume that the analyses are valid.

In addition, several respondents in both LIAM analyses failed to answer the questions designed to measure Interest Group Support in this study, either at all, for any organization, or for one or more of the assigned organizations. This may have been because the questionnaire did not define "interest group" in such a way that the term was understood by all respondents. For example, one respondent listed the APA as an interest group of the KEA.

And finally, these organizations appear to be quite similar in terms of the Organizational Expertise each had at its disposal in this conflict. Most of these organizations either have established routines for collecting and disseminating information in conflicts of this type, or contain subunits that routinely do. The KEA hired outside consultants to provide technical expertise during this conflict. In addition, many of these organizations worked together to select and utilize the appropriate methodologies, conduct and analyze the results of field studies, and develop mitigation plans. These factors may well have resulted in a valid perception that these organizations were more or less equal in terms of Organizational Expertise.

The boxplots also show this to be the case, at least as perceived by these two sets of respondents (especially in Phase I for the NPOs). From Figure 11 (Phase I, NPOs), the overall pattern for the seven organizations on the Organizational Resources variable is towards the middle, a pattern that is repeated in Figure 12 for Expertise, and again in Figure 13 for Interest Group Support. The FWS-ES and FERC, however, are clearly identified as the most powerful in terms of Expertise. This result is not surprising. The FWS-ES worked closely with the applicant, and with the FERC staff biologists, to develop study plans and mitigation alternatives for this project. The FWS-ES tends to have the capability to provide biological and technical expertise in conflicts of this type.

According to the PO boxplots (Figures 14, 15, and 16), FERC has the most Resource power in this conflict, the FERC and the FWS-ES had the most Expertise, and the KEA and ADNR the most Interest Group Support. The other organizations were evaluated as having moderate or minimal amounts of power in each category. These evaluations are not surprising. The FERC is always involved (as the ultimate decisionmaking authority) in licensing applications; it is not surprising that its organizational resources are seen as substantial, especially since frequency and intensity of involvement, as well as statutory power to make the ultimate decision, are elements of organizational resources within this model. The FERC and FWS-ES biological staff both have a great deal of training, experience, and expertise in the technical and biological aspects of hydroelectric project planning, construction, and operation. In addition, the KEA was representing a large constituency in this conflict.



### Construct Validity: Hypothesized Relationships

The Broker and Arbitrator role types are hypothesized to represent opposite ends of the same behavioral continuum. An organization scoring high on one role index should theoretically score low on the opposite index. The same logic applies to the Advocate-Guardian role continuum. In both cases, there should be a statistically significant and inverse relationship between the two variables. Table 4 contains Spearman's rank correlation coefficients for these two relationships, as well as the correlation coefficients calculated for other combinations of role types: Broker-Advocate, Broker-Guardian, Arbitrator-Advocate, and Arbitrator-Guardian.

As can be seen in Table 4, only one of the hypothesized relationships holds: the Advocate and Guardian role types are inversely and significantly correlated in both Phase I ( $r_s = -.664$ ) and Phase II ( $r_s = -.720$ ). These two role types apparently occupy opposite ends of the same behavioral continuum, as predicted by the model. In the case of the second relationship, the results are not as expected for either Phase I or Phase II. There is a small but positive relationship between the Broker and Arbitrator values for the five major organizational participants; this relationship is significant in Phase I. The failure of these results to show a strong inverse relationship between Broker and Arbitrator is surprising. At second glance, however, these findings may result from the fact that, in this particular conflict, these organizations were giving mixed signals, i.e., at different stages of the negotiation the organizations preferred different processes. The evaluations of these organizations, then, may be accurate rather than a reflection of problems with the model or the questionnaire. Further testing of this model needs to be made before any definitive conclusions can be drawn in this regard.

No other significant relationships were postulated among the role types. The Arbitrator role type is not significantly correlated with either the Advocate or the Guardian variable. The last set of relationships in Table 4 is quite interesting, however. The Broker role type is significantly and inversely related to the Advocate role type in both LIAM analyses, and these relationships are moderately strong ( $r_s = -.365$  and  $-.493$ ). On the other hand, the Broker role type is significantly related to the Guardian role type in both analyses. This relationship is positive and fairly strong in both Phases I and II ( $r_s = .663$  and  $.721$ ). In the Terror Lake conflict, the Guardian organization (KEA) was viewed as quite powerful in terms of the organizational resources it had to pursue its interests. Indeed, Guardian organizations in general tend to possess a great deal of organizational resources in disputes of this type. The KEA also hired outside consultants to obtain the expertise it needed. In order to formulate other explanations or draw more definitive conclusions about these relationships, it would have been helpful if more than one clearcut Guardian were involved, or more than one conflict analyzed.

Table 5 shows the correlation coefficients between the role and power variables in both LIAM analyses. Six sets of variables are significantly correlated with one another in the Phase I (NPO) analysis, while only one

Table 4. Role correlations: Spearman's rank correlation coefficients.\*

Variables	Phase I	Phase II
Broker-Arbitrator	.286**	.183
Advocate-Guardian	-.664**	-.720**
Arbitrator-Advocate	.085	-.022
Arbitrator-Guardian	.052	.159
Broker-Advocate	-.365**	-.493**
Broker-Guardian	.663**	.721**

\*Calculated for the five organizations common to both LIAM analyses.

\*\*Statistically significant at  $P \leq .05$ .

relationship is significant in the Phase II data set. Interestingly enough, this latter finding is for the relationship between Arbitrator and Organizational Resources ( $r_s = .709$ ). One of the measures of organizational resources, however, is also one that is associated with (and measured by) the Arbitrator index. When the data for this organizational power question were removed from the test, however, the strength of the relationship went up rather than down ( $r_s = .745$ ). It was still significant. The FERC was evaluated by the POs as the most powerful organizational participant, in terms of the resources it had at its disposal in this instance. The previously hypothesized relationship between Organizational Resources and the Broker role type did not hold in the Phase II analysis. The hypothesized relationship between the Arbitrator role type and Organizational Expertise did not hold in either analysis. There is no reason to believe that these same results would show up in other conflicts of this type, though the relationship between role and power would more likely differ from situation to situation, depending on the circumstances and organizational participants involved.

#### Cross-Validity

According to at least one expert in questionnaire development and testing (Kleinmuntz 1967), when two applications of the same instrument produce largely similar results, one can reasonably assume that the analyses are valid. That is, one can reasonably conclude that the instrument is producing results that reflect reality. Although the respondents were not the same in this study, the focus and context of the analysis were. Thus the same sort of conclusions can be drawn about the results.

Table 5. Role and power correlations: Spearman's rank correlation coefficients.\*

Variables	Phase I	Phase II
<u>Broker</u>		
Resources	.531**	.372
Expertise	-.111	.140
Support	.255	.366
<u>Arbitrator</u>		
Resources	-.002	.709**
Expertise	-.045	.336
Support	.029	.058
<u>Advocate</u>		
Resources	-.375**	-.309
Expertise	.441**	.136
Support	-.380**	-.261
<u>Guardian</u>		
Resources	.535**	.309
Expertise	-.166	.124
Support	.520**	.469

\*Calculated for the five organizations common to both LIAM analyses.

\*\*Statistically significant at  $P \leq .05$ .

In view of the design and methods employed here, the evidence presented on behalf of the instrument's reliability is also relevant to cross-validation. The four role types postulated in this model appear to have cross-validity. This is because the results of the Phase I and II analyses are largely the same, as indicated by the boxplots. In Figures 7 through 10 (which contain both the NPO and PO role boxplots for the five key organizations common to both LIAM analyses), the overall pattern is remarkably similar between the two. This is especially evident in Figures 9 and 10, for the Advocate and Guardian variables, respectively. The patterns between Phase I and Phase II for these organizations are virtually identical. And although the Mann-Whitney test did not result in acceptance of the null hypothesis that the Phase I and

Phase II analyses are identical ( $P \geq .95$ ) for any role variable, the Spearman correlation coefficients for all four role variables indicated a significant and positive relationship between the two.

The same conclusion could not be drawn for the power variables, however. Figures 17, 18, and 19 depict the boxplots for the five organizations common to both LIAM analyses. Although the underlying patterns are similar for all three power variables, in only one case does the Mann-Whitney test permit the acceptance of the null hypothesis that the two analyses are identical at  $P \geq .95$  (Organizational Resources,  $P = .98$ ). In addition, only the Organizational Resources variable attained the .80 reliability standard for declaring two analyses to be similar. And even in this case, the Spearman rank correlation coefficient was less than the .90 required to reach significance.

Two explanations for these results seem plausible. First several respondents in both LIAM analyses failed to answer the questions designed to measure Interest Group Support in this study, either at all, for any organization, or for one or more of the assigned organizations. This may have been because the questionnaire did not define "interest group" in such a way that the term was understood by all respondents. For example, one respondent listed the APA as an interest group of the KEA.

Second, since the NPOs were relying on the case study to evaluate this conflict, the case study may have been the intervening variable here, as elsewhere. That is, there simply may not have been enough information to allow a robust analysis of Organizational Expertise or Interest Group Support. Power was not considered in the content analysis; therefore no definitive conclusions can be drawn about the availability of information of Organizational Expertise and Interest Group Support at this time.

Although no direct test of respondent reliability was used in this study, background data were collected from Phase II respondents. This information was used in a cluster analysis of the PO data.

#### INDIVIDUAL BIAS: CLUSTER ANALYSIS

When cluster analysis was performed on the responses of the POs to the LIAM questionnaire, two distinct groups (or clusters) were identified, according to professional background. The results of the cluster analysis suggest that part of the variation in responses among the POs for the seven major organizational participants in the Terror Lake conflict may be a function of individual differences among these respondents in professional background.

As can be seen in Figure 28, although the five biologists fell into two other subgroups, with two biologists more alike in their responses than the other three, the clear differentiation is between the engineers and biologists. The results of a cluster analysis only reveal that the responses differed; it does not specify the shape or direction of that difference. This is an interesting finding, although not a surprising one (Lamb 1986). Most, if not all, academic disciplines impart different perspectives and world views to

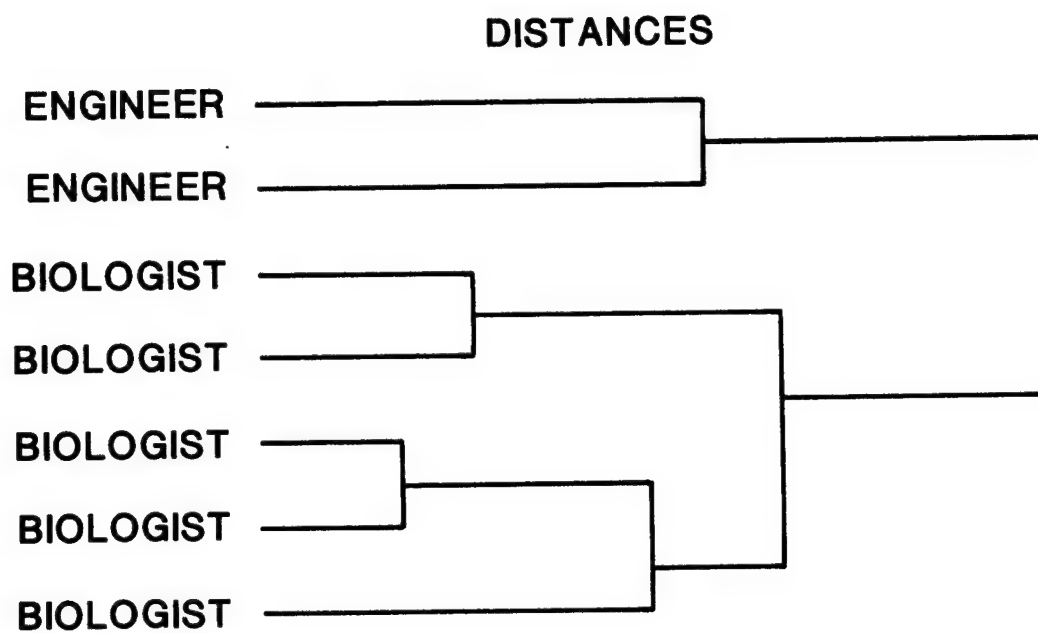


Figure 28. Phase II (PO) cluster analysis dendrogram: two groups of respondents identified by professional background (engineers and biologists).

students. What is interesting in this case is that a certain amount of that bias apparently influences the way in which these individuals view the resource conflicts in which they become involved. This becomes especially important given the tendency of organizations to recruit individuals from particular professional backgrounds, to the exclusion of other professions. Such a tendency could well inhibit the ability of organizations to communicate effectively with one another in conflicts of the type described in this study.

## DISCUSSION

### SUMMARY

The results of this study provided a substantial amount of support for the reliability and validity of the LIAM and the LIAM questionnaire. Although some problems were identified, additional studies need to be conducted prior to revising either the model or the questionnaire.

#### Reliability

The LIAM instrument is reliable, as evidenced by the fact that both the NPOs and POs showed agreement among themselves in their analyses of the major organizations involved in the Terror Lake conflict. Where there was dispersion, it appeared to be the partial result of intervening factors, such as the evaluation of inappropriate organizational representatives or the evaluation of too large an organizational unit. Both sets of respondents were more consistent in their evaluation of these organizations in the Advocate-Guardian behavioral dimension than in the Broker-Arbitrator dimension, and overall, the PO evaluations were more consistent than the NPOs. This is not surprising, however, since the NPOs relied on a written case study for the information needed to analyze these organizations.

In addition, the two LIAM analyses yielded remarkably similar results. Not only was this obvious in the two sets of boxplots, but when the Phase I role data were correlated with the Phase II role data (for all four role types), the resulting coefficient was much higher than the .80 required to demonstrate reliability, and in each case, the correlation was significant.

Although the Phase I and II power boxplots were similar, the Mann-Whitney test resulted in the acceptance of the null hypothesis for only one power variable: Organizational Resources. For the other two power variables, the null hypothesis could not be accepted. In addition, none of the Phase I versus Phase II correlation coefficients was significant, although the correlation of the two sets of Organizational Resource data did produce the .80 required to demonstrate reliability. Again, these findings may be a reflection of the fact that not enough information was contained in the case study for a robust analysis of organizational power. Since power was not examined in the content analysis, no definitive answer can be given in this regard. However, one observation comes to mind. Because of the number of missing values for the Interest Group variable, it seems obvious that these

respondents had problems with this concept. More attention needs to be paid to the way in which this variable is defined in the questionnaire, prior to conducting further studies.

### Content Validity

The content validity of this approach--both in terms of the degree to which the questions seem logically tied to the concepts being measured and the degree to which the model represents all theoretically relevant elements of organizational role and power postulated in the literature--appears to be well documented. The questionnaire went through several revisions, and a systematic attempt was made to meet the highest scientific standards in questionnaire design. The validity of the LIAM instrument was rigorously examined by the investigator and others, including two specialists in the field of questionnaire development. The LIAM approach also was assessed by a panel of experts (see Appendix IX) prior to the beginning of this study.

### Empirical Validity

Conclusions about the predictive ability of the LIAM are mixed. The most consistent match between predicted and observed behaviors occurred in the behavioral dimension associated with preference for outcome: Advocate-Guardian. Even here, however, the match was not perfect. While there was a fit between predicted and observed quadrant behaviors (A-D) that contain general behavioral predictions, the LIAM instrument did not always accurately predict the specific behavioral patterns associated with a particular sub-quadrant (1-16). In addition, in the behavioral dimension associated with procedural preferences, the LIAM analysis predicted the opposite type of behavior for some organizations than what was reportedly observed by the POs. Several factors may have contributed to these results.

First, the special circumstances surrounding this conflict may have resulted in the organizations giving mixed behavioral signals as the conflict progressed. This would account for the inability of the respondents to agree on the type of behaviors observed for these organizations, in this behavioral dimension. This would not explain the apparent inability of the instrument to accurately predict organizational behavior, however, for those cases in which a majority of the respondents agreed. Both the FERC and FWS-ES are cases in point. The LIAM analysis predicted these organizations would exhibit behaviors associated with a preference to operate in the regulatory arena--as they typically do. Most respondents observed, however, that both organizations emitted Broker-like behaviors.

Second, the fault may lie partially in the design of this stage of the study. Another method may have been appropriate for "observing" actual behavior than the matching exercise, such as placing third-party objective observers at the scene of the negotiation and having these individuals record the behaviors by the individual organizational representatives. In addition, content analyses could be conducted of the written communications between organizations. Such an approach would provide a more systematic and objective method for "observing" behavior. It would have been helpful in this study, however, had the respondents been given clear and specific organizational

subunits on which to focus, in both answering the LIAM questionnaire and in the selection of observed behaviors (where more than one unit was involved, as was the case with FERC and FWS-ES).

Third, the way in which the behavioral predictions themselves were developed and incorporated into the model may be incorrect. Although the connection between the theory and the questionnaire was systematically examined, no specialists were consulted in the development of the behavioral predictions. For example, the connection between organizational characteristics and behaviors may not be well-enough developed. The distinction between primary and secondary role types--which shape subsequent organizational behavior--may be unrealistic, or not adequately addressed in the questionnaire. Prior to conducting additional studies, this aspect of the model needs to be examined further.

#### Construct Validity: Group Discrimination

The LIAM allowed users to discriminate among different organizational types for all four role variables. In both Phase I and Phase II, the Kruskal-Wallis test resulted in the rejection of the null hypothesis that the evaluations of the different organizations are identical. Thus, all organizations were not viewed the same, regardless of differences between them. Further examination of the direction of the analyses, moreover, led to the conclusion that none of the categorizations was contrary to what was theoretically and intuitively expected.

Using the Kruskal-Wallis test, the null hypothesis could be rejected at  $P \leq .05$  for only one of the power variables: Organizational Resources. This finding may actually reflect reality in this case, however, since these organizations were quite similar in terms of Expertise and Interest Group Support. This interpretation is also supported by the fact that the underlying pattern of the power boxplots for Phase I and Phase II were remarkably similar.

#### Construct Validity: Hypothesis Testing

Four hypotheses about the relationships between the four role variables and between the role and power variables were tested in this study. Only one of these relationships held. As predicted, the Advocate and Guardian role types were inversely and significantly correlated in both analyses. Contrary to expectations, however, a small but positive relationship was observed between the Broker and Arbitrator variables in both analyses; in Phase I, this relationship was significant. This latter finding may well be a function of the fact that the organizations, as previously discussed, were giving mixed signals in this conflict; that is, perhaps each of these organizations always preserved the same goal or outcome, but preferred different processes to achieve that outcome as time wore on. As a consequence, both types of behaviors (Arbitrator and Broker) may have been observed.

A second explanation, however, may be found in the theory from which these two role types were developed. Since resource conflicts of this type are increasingly negotiated, perhaps a more realistic dichotomy in this behavioral dimension should center on analyzing various aspects of the



negotiation process. This may be true even in situations where an arbitrating organization is authorized to make the final decision, as was the case here. Since these categorizations were originally developed, much has changed in the process of implementing environmental regulatory policy. Perhaps the model needs to be refined to reflect these changes.

The hypothesized relationships between (1) Broker role type and Organizational Resources and (2) Arbitrator role type and Organizational Expertise did not hold. The only significant correlation between role and power occurred between Arbitrator and Resources. At this point, it seems reasonable to tentatively conclude that the role and power relationships differ from one situation to the next, depending on the nature of the conflict and the organizations involved. Nonetheless, a second study using LIAM should include another test of these relationships. The failure of the Broker/Arbitrator role types to be significantly and inversely related in this instance may have contributed to this finding.

#### Cross-Validity

If the role and power types contained in the LIAM were nonexistent, one would expect the two analyses to produce widely divergent results. Moreover, underlying patterns of the analyses would not be evident--or in a direction that makes theoretical and intuitive sense. This was not the case in this study.

#### CONCLUSIONS

The questionnaire developed from the theoretical postulates of the LIAM apparently is both reliable and, for the most part, valid. If the role and power types identified in the model did not exist, users would be unable to recognize and apply them consistently in an actual resource conflict. There would be a substantial amount of disagreement among the same set of users, and between repeated applications of the questionnaire. The underlying patterns would not be similar, and would not make theoretical sense. Indeed, no pattern at all would be observed. Second, the instrument would neither permit users to differentiate among dissimilar organizational types, nor to similarly categorize like organizations. For all four role types, users were able to accomplish this goal, and to do so in an intuitively and theoretically sound direction. Although only one of the two hypothesized role relationships held, there is evidence that this finding may have resulted from the unique circumstances surrounding the Terror Lake Conflict. The organizations may have been giving mixed signals where both Broker- and Arbitrator-like behavior were observed. Thus, it appears then that the LIAM is a useful and valid tool for categorizing and understanding organizational behavior, and for examining the distribution of organizational power in a given conflict.

#### IMPLICATIONS

Legal-institutional analyses, including the model described in this study, do not have to be conducted with a questionnaire, computerized or

otherwise. The point of this study in its practical implication remains the same: communication is frequently a problem among organizations participating in environmental impact assessment negotiations. It is a problem for the regulated and regulators alike. One of the reasons is that misperceptions exist, and misunderstandings develop among the parties, misperceptions and misunderstandings that could be avoided if interorganizational understanding could be improved, thereby fostering cooperation. This study makes two practical contributions. First, it highlights and documents the importance of assessing conflicts prior to becoming involved in their resolution. This means going beyond traditional examinations of relevant laws and policies, and even beyond the politics and institutions involved, to an in-depth analysis of the process and the organizational participants, with an eye toward understanding both the biases of the implementation process and the ways in which the various organizations will interact to influence the outcome. Second, a formal instrument that allows individuals to systematically conduct legal-institutional analyses was documented, refined, and tested. The idea was to provide practitioners with a useful tool with which to systematically analyze a conflict. Although some problems were identified with the questionnaire, additional studies can overcome these problems.

The LIAM questionnaire can be used to analyze water resource disputes as it currently exists, with several important caveats. Apparently, the LIAM questions that are associated with preferences for outcome are both reliable and valid, and thus may be used with confidence. In the case of the questions developed to measure characteristics associated with organizational preferences for procedure, users should take care to define the timeframe of the analysis, and to reevaluate the results if and when changes occur in the politics surrounding the conflict. Direct participants would be more likely to be aware of these changes, and thus these individuals should actually conduct the analysis. Furthermore, since professional training appears to affect the way in which different individuals assess organizations, more than one respondent should analyze each organization; results should be averaged for each organization; and more than one profession should be included. In addition, users should keep in mind, when developing negotiation strategies, that although organizational resources are apparently measurable by the LIAM instrument, the impact that this resource will have on both organizational behavior and ultimate outcome will tend to vary from conflict to conflict. The same conditions appear to hold for organizational expertise. In the case of interest group support, care should be taken that analysts understand this concept before conducting LIAM questionnaire analyses. And finally, the behavioral descriptions developed in association with the 16 subquadrants of the LIAM role map were not validated in this study. Although they can be used to understand the general nature and direction of organizational behavior in a given conflict, they should not be considered as absolute predictive indicators of organizational behavior.

#### AGENDA FOR THE FUTURE

Future studies should attempt to accomplish the following two goals: (1) the theory relating to the regulatory versus distributive policy arenas that underlies the LIAM Broker-Arbitrator behavioral dimension needs to be

reexamined. In particular, the degree to which water resource conflicts that arise in this arena are resolved through negotiation needs to be determined. If this is most often the case, even in situations where an Arbitrator has the authority to make the ultimate policy decision, then future research needs to turn toward redefining this body of theory, at least with regard to water resource regulatory policies. Subsequently, the Broker-Arbitrator behavioral continuum would need to be refined, to reflect an "encourages bargaining/discourages bargaining" continuum, and new questions developed and tested that attempt to measure organizational characteristics and predict behavior along the refined continuum. And finally, the behavioral predictions currently contained in the LIAM would also need to be revamped to reflect these changes. Once these goals were accomplished, one could turn toward a further examination of the concept of communication; and (2) it would be interesting and important to determine the degree to which the LIAM, once refined, actually helps accomplish what it was designed to accomplish: improved interorganizational understanding and communication. If this turned out to be the case, attention could be turned toward determining whether or not improved understanding and communication actually affected ultimate implementation outcomes.

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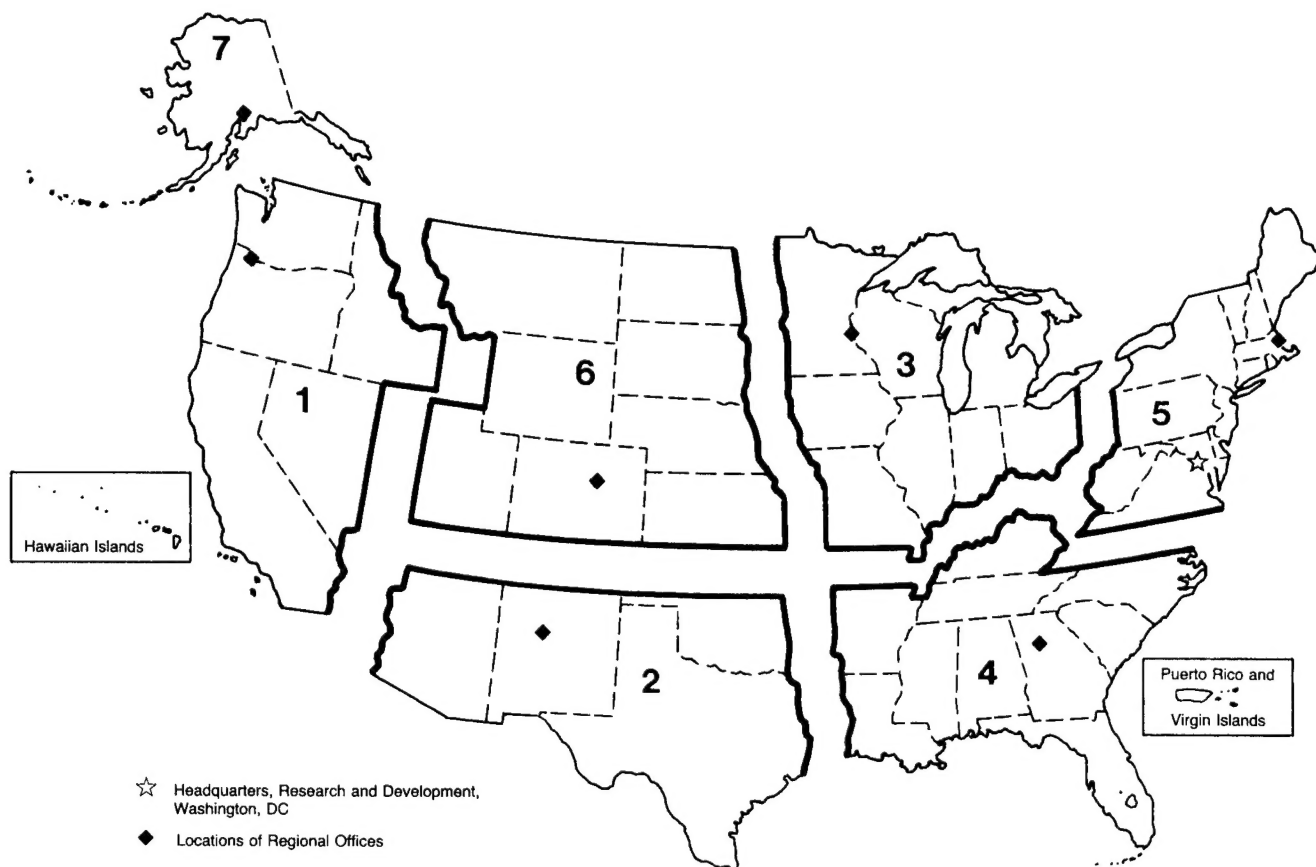
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